MUNICIPAL JOURNAL AND ENGINEER

VOL. XVII NEW YORK, DECEMBER, 1904 No. 6

THE POLE AND WIRE NUISANCE

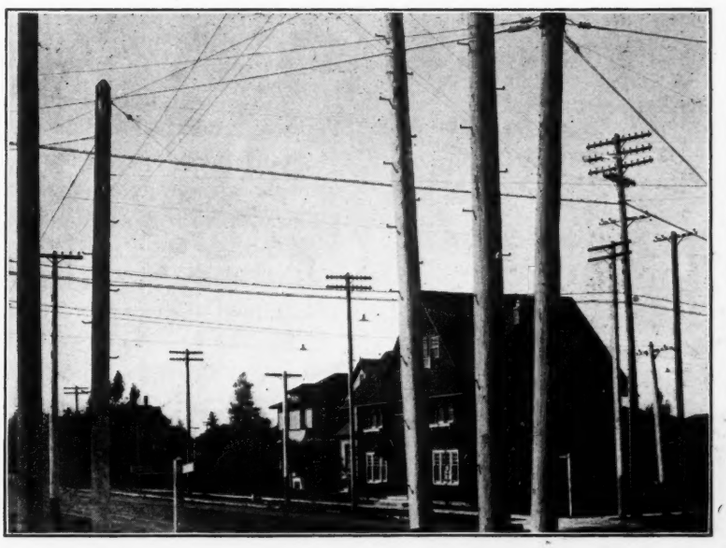
Legal Status of the Telegraph Pole—Value of the Axe and the Injunction Suit—Good-Natured Indifference of Citizens

By Charles Dwight Willard

THE astonishing increase of telephone and electric light service in cities and suburban districts, and the multiplication of trolley lines, has within the past few years brought the nuisance of the overhead wires and their accompanying poles to an acute phase. Whereas fifteen years ago the telephone did not average, in our large cities, one instrument to every 250 people, the ratio has now increased to one to twenty and in some cases one to ten or even higher. The electric light has superseded gas in all modern buildings and residences, and the trolleys cover from 10 to 30 per cent. of the street mileage of the populous cities.

COMPETITION AUGMENTS THE NUISANCE

Within the last five years the pest of poles has taken on new terrors in over one-third of the cities of the Union, by the entrance of competing telephone lines, and of wires destined for the distribution of power. In some instances the exactions of the old companies have induced the people to welcome the competition with open arms, granting franchises without restriction as to the setting of poles; and in other instances a complaint or corrupt city government has made the way easy. Examples may be quoted in western cities where one residence street has been loaded down by two trolley companies with independent wires, two telephone companies, each carrying not only the wires for local distribution but the through cables as well, three electric lighting companies, and one power company with heavy poles and thick cross arms, carrying wires with a tremendous voltage.



WHO OWNS THE STREET?—PICO AND ALVARADO

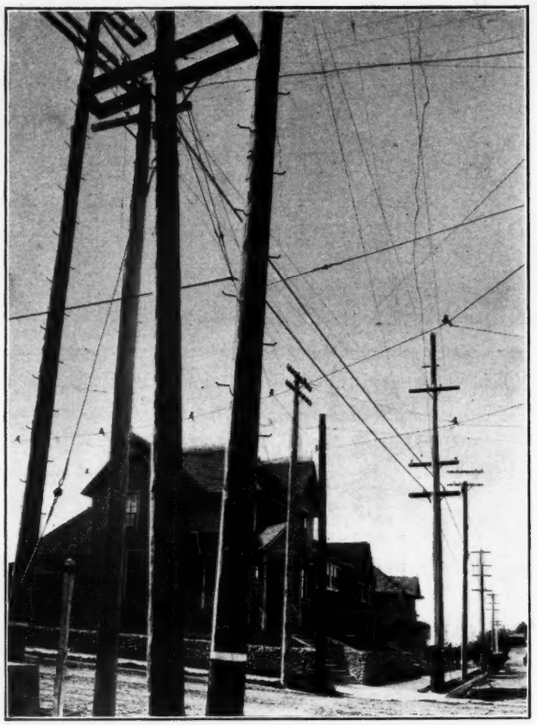
This forest of poles running along the parkway of residence streets with the net work of wires they support, is not only objectionable from an aesthetic point of view in the ruin it works to the beauty of the landscape, but it also interferes with the growth and in some cases with the very existence of shade trees, and is sometimes an actual menace to human life. A single line of poles and wires may do no great amount of damage, but when several independent systems having poles of different heights, carrying wires for a variety of purposes, undertake to make room for themselves on one street, the interests of the owners of the property and of the public using of the thoroughfare are entirely forgotten. In a bulletin on this subject issued by a municipal organization in a large western city, it is stated with respect to the extent of the nuisance there: "These poles frequently number eighteen to each side of the 350-foot block. There are corners in the best residence districts where over twenty-five poles may be counted within a radius of 100 feet. There are instances where eleven poles may be found on a 50-foot corner lot."

One or two wires may be able to make their way safely

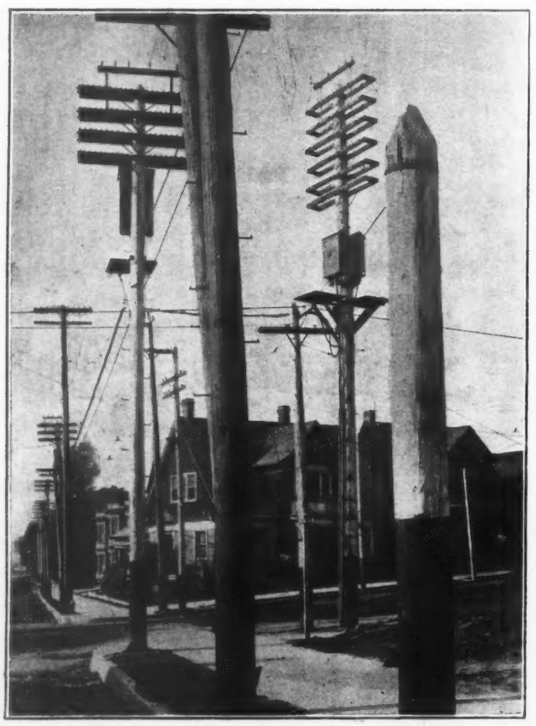
through the branches and foilage of the shade trees without much cutting, but when a mass of wires measuring four by six feet or more is to be accommodated, the tree must be trimmed to a mere shell. If the householder is on guard watching the process, it may be done with some consideration for the future of the tree; but if the lineman is left to his own barbarous devices the tree may be hopelessly maimed or even killed. It has been found in some eastern States that drastic legislation is needed to keep these vandals from girdling or chopping down trees that interfere with their stringing of wires. The tree and the electric wire are necessarily enemies; they cannot abide together in peace. Where the tree's foilage is wet by rain it will carry the current from wire to wire and will even conduct to the ground. It interferes with the usefulness of the telephone wire if it touches it anywhere, and it renders power and light wires dangerous to life. Hence the lineman hates the tree and will absolutely destroy it, if given the opportunity.

Legal Status of Street Pole in Dispute

The exact legal status of the pole on the edge of the street has never been clearly defined, and there is need for some pugnacious lover of the beautiful, who can endure the worry and expense of long litigation, to sally forth either with an axe or an injunction suit for some offending pole that obstructs his view and access, and then carry his defense to the court of last resort. The owner of property along a public thoroughfare owns, in theory, to the middle of the street, granting to the city a perpetual easement to his fence line for public purposes. The authorities of the city may grant franchises for public utilities along or across the street, but it is a question whether a franchise will hold, under contest, when it infringes upon the fundamental rights of the property owner, particularly if it can be shown that the public advantage supplied by the franchise can be attained in some other way. A telephone is, we may admit, a necessary public utility, but poles and overhead wires are not required to conduct a telephone service. These wires may be taken care of in a conduit under ground, and in the business sections of our larger cities that method of carrying the wires is now well-nigh universal. This is ordered done by the city authorities as a measure of fire protection. Suppose a gas company were to say: "Putting our pipes under ground is an intolerable expense; we will run them and their connections along the surface. It will be something of a nuisance for property owners and pedestrians to step over them, but not much more of a nuisance than it is to walk around telephone poles. We carry a necessary public utility, and we stand on our rights to use the thoroughfare as we please—just as the pole companies are doing." Is not the plea logical enough? Thrice the tale of bricks, and then comes Moses. The public is meek and forebearing, but there are limits to what it can be made to endure. It is the multiplication of the poles that will in the end work their destruction.



GOOD ARCHITECTURE CRUCIFIED—NINTH AND PARK VIEW



MANSIONS IN THE SKIES—SEVENTH STREET

Best Methods of Handling Nuisance

Half a dozen methods are suggested for the treatment of the pole and wire evil, only one of which is a cure; the others are palliatives.

One of the latter is that the poles should be made less offensive to the eye by painting them green or by the substitution of a neat iron, or hard wood turned pole, for the rough-hewn pine article that commonly prevails. Another is that the various companies be required to combine on one set of poles. This is difficult to bring about, because of the jealousy and quarrels of the conflicting interests, and also because the induction from the high voltage light-and power-wires will interfere with the usefulness of the telephone.

THE "UGLIFICATION" OF NINTH STREET

In cities that possess alleys the nuisance is reduced to a minimum by placing the poles there, but in some cities the alleys are so narrow that when the poles begin to multiply it is impossible for wagons to pass each other. Many cities have no alleys, and there are not a few civic authorities who contend that the alley belongs to the epoch of concealed plumbing, and that at some future date back fences will all be removed and alley and yards thrown into one general park. There is no place in such a scheme for poles and wires in the rear. In Kansas City, in a region where there were no alleys, the experiment was tried of running the wires through the back yards, the property owners believing that they would be less of a nuisance there than in the parkway of the street; but this plan has failed to give satisfaction, and is being abandoned. The constant presence of linemen on the poles destroyed privacy and became quite intolerable.

Electric Conduits the Only Effective Method

The only complete and effective remedy for the pole and wire nuisance is the establishment of a conduit district by the authority of the city, and this policy has been carried out to a greater or lesser extent in three-fourths of the larger municipalities of the Union. In some cases, together with the establishment of the original conduit district, provision is made for its annual enlargement. Except in two or three of the largest cities the trolley poles and wires are omitted from this arrangement, as the conduit ordinances were for the most part passed before any feasible method had been devised for supplying the car current by other means than an overhead wire.

The extent to which the conduit requirement has been carried in American cities may be shown by a synopsis of figures recently obtained through the public works departments of thirty municipalities. The list is not quite complete, but nearly so.

Many Cities Have Already Put Wires Underground

Boston has 325 miles of street in its underground district, and is adding to it at the rate of two miles a year. Minneapolis has 250 miles of conduit area, but allows distribution poles in portions of the region. St Paul has seventy miles and is constantly adding, but at no established ratio. St. Louis has an enforced district of thirty-seven miles of street and twelve and a half miles of alley; but the companies have voluntarily made considerable additions to this area. Worcester has sixty-five miles of street in conduit and is adding at the rate of three miles per annum. The Worcester ordinance provides for the ultimate clearing of all streets within a two-mile circle from the City Hall. Cincinnati has an underground district comprising four square miles from which most of the poles have been taken away and the rest are to follow. Ten years ago Milwaukee adopted an ordinance providing for the removal of electric light poles within a radius of two miles from the post-office. This would figure to about twelve and one-half square miles of the city. The telephone is under ground in the central portion of this district. Philadelphia has 861 miles of conduit, but no area in which poles are entirely absent. Providence has about thirty-five miles of street free from poles. Rochester has five miles of completed underground district with thirty-five miles of electric lighting and twenty-two miles of telephone. Cleveland has one and one-half square miles, with no overhead construction, and is adding to this area at the rate of two miles a year. Buffalo has seventeen miles of clear street, but there are in addition to that about 100 miles of conduit. Detroit has an area of about two and one-half square miles that is cleared of all poles, except the trolley and those used for distribution. Baltimore has about one-third of a square mile under conduit. San Francisco has twenty-three miles of street practically clear of poles. Los Angeles has seven miles clear, with a two mile addition per annum. Allegheny has two

PUZZLE: FIND THE HOUSE—FIGUEROA STREET

square miles. Columbus and Newark each have about four linear miles. Rochester about twenty miles. The Island of Manhattan is practically clear of poles and wires, as is also the entire city of Washington and all the business portions of Chicago.

Public Service Corporations Build Own Conduits

In a great majority of cases the work of putting the wires underground has been voluntarily undertaken by the utility companies, partly to insure better service and partly because of the demonstrated economy of the conduit plan. Given a thickly settled region with a general use of telephones, and the difference in cost of maintenance in favor of the wires underground as against wires overhead, will considerably more than pay the interest on the conduit investment. This is not true to the same degree of the lighting wires, and hence it follows that these are usually put under by municipal authority based on the necessity for protection to human life. There are, however, eight or ten American cities of over 100,000 population, where the service companies have resisted all change and where the pole and wire nuisance has full sway.

How Los Angeles Handles Nuisance

The City of Los Angeles, California, has just adopted a unique method of handling the nuisance in the residence section. The business portion of that city having been pretty well cleaned up, it was decided after much discussion that two miles of street should be brought into conduit each year in the residence district. As Los Angeles has no alleys, and as there are two telephone companies supplying one instrument to every six inhabitants, the largest ratio of any city in the Union, the pest of poles and wires had become almost unbearable. The City Council, however, refused to agree to the two-mile per year conduit addition, unless it were embodied in a plan whereby the selection of the area could be made on some basis that would not be open to the charge of favoritism. To select some particular two miles of street for this advantage, when the whole city was clamoring for it, would involve difficulties the authorities were not willing to face. The arrangement finally effected provides for the filing of petitions by improvement associations representing the various streets contending for the favor, in which they set forth what improvements they are willing to make if the conduit privilege is granted; and the streets or regions with the best showing win. Two of the best resident streets of the city have entered the contest, offering to carry out a whole series of improvements, which would make them over into handsome boulevards, if their poles and wires are removed. This plan has been passed upon by many of the best civic authorities in the country and declared to be doubly effective; for it not only disposes of a nuisance but turns it to actual advantage in bringing about improvements.

PART OF EXHIBIT AT MUNICIPAL EXPOSITION AT DRESDEN, GERMANY

PORTLAND CEMENT*

Its Use in Engineering Constructions—The Setting and Hardening of Cement Continued

By E. Kuichling, C. E.†

THE views of several well-known authorities on the subject of the setting and hardening of cements have been set forth more or less fully in the preceding numbers of the MUNICIPAL JOURNAL AND ENGINEER (see Vol. XVI., pp. 160-1, 206-210, 264-5, and Vol. XVII., pp. 18-20, 65-8, 151-7, 210-3), and supplementary thereto a few more may also be cited.

AMERICAN AUTHORITIES

GILLMORE, in his treatise on "Limes, Hydraulic Cements and Mortars," New York, 1874, adopts for common lime mortars the theory that some of the hydrate of lime enters slowly into true chemical combination with the silica of the sand; that another portion crystallizes between and adheres firmly to the surfaces of the grains of sand; and that in the process of drying the remainder of the lime absorbs carbonic acid from the air, thus forming calcium carbonate; hence that the hardening of such mortars must be ascribed to these three causes collectively. For hydraulic mortars, he assumes that the calcic compounds produced by burning become hydrated when mixed with water, and then "undergo a species of crystallization, technically termed setting"; also that the most important factor in cements is anhydrous tri-calcic silicate, which is decomposed by water into hydrated mono-calcic silicate and calcium hydrate, "and that the degree of hardness attained depends on the molecular condition of the silica and the amount of base which ultimately combines with it."

If the cement consists of both basic silicate and aluminate of lime, he states that the admixture of water will result in the formation of hydrated tri-calcic silicate and aluminate. He also states that magnesia plays an important part in the setting of hydraulic mortars, inasmuch as tri-magnesium silicate and aluminate are formed in burning, which become hydrated when mixed with water and resist the dissolving action of sea-water better than the silicate and aluminate of lime. These conceptions appear to have been derived from the studies of Chatoney and Rivot, but as they are not sustained by later researches, they may accordingly be dismissed from further consideration.

CUMMINGS, in his book on "American Cements," Boston, 1898, expresses the opinion that when lime, magnesia and alumina are present with silicic acid in the raw materials, "a combination is formed by the acid and the three bases in fixed and unalterable proportions, in accordance with the law of atomic weights," thus forming on calcination anhydrous silicates of lime, magnesia and alumina. On being mixed with water, these silicates become hydrated and crystallize more or less rapidly, forming a cohesive mass. The hydrated silicates of lime and alumina render the mortar hard and brittle, while the silicate of magnesia is assumed to impart to it a peculiar toughness or tenacity, which is in direct proportion to the quantity of magnesia present. These views differ radically from those of most other investigators, and may therefore be regarded as not proven. Of the mechanism of the setting and hardening process, little is said.

ANDREWS, in Jameson's work on "Portland Cement," New York, 1898, states that the setting of a cement is a complex process, partly chemical and partly mechanical in nature. In general, the chemical changes may be said to afford opportunity for the mechanical changes, or processes of crystallization, to cause the hardening. When mixed with water, a portion of the grains of cement dissolve, and is redeposited in crystalline form in combination with water between the other grains, binding them together at numerous points of contact. The solidity of the resulting mass depends:—1. On the area of contact between the grains. 2. On the original volume or density of the cement. 3. On the increase of volume due to hydration; and 4, on the inherent tenacity of the material which binds the grains together.

"If the hydration takes place rapidly, the crystallization will be imperfect, and many of the crystals will be too small to bridge over the distance between contiguous grains of cement. Under these circumstances incomplete adhesion will follow and a weak or friable cement will be the result." For the chemical reactions of hydration and the processes of crystallization, the author follows Le Chatelier very closely, remarking that if the crystals of hydrated calcic aluminate, which extend in every direction in the form of felted needles and are the first cause of setting, do not have time to form completely, the toughness of the mass will not be properly developed.

SPALDING, in his book on "Hydraulic Cement," New York, 1897, states that very little is definitely known concerning the chemical reactions which take place in the process of setting and hardening of cement mortars, and that many theories have been proposed to account for the phenomena by different observers. He gives, however, an outline of Le Chatelier's views on the subject, and presumably accepts them as the best available explanation.

ENGLISH AUTHORITIES

Most of the recent English authors have also adopted Le Chatelier's views, although REID, in a discussion of the subject before the British Institution of Civil Engineers in 1892, is of the opinion that the phenomena of setting and hardening are best explained by Michaelis' theory that the silica is in the colloidal state. He furthermore asserts that there is no good evidence that the hydrate of lime in mortar ever combines chemically with quartz sand, and cites sev-

* Copyright, 1904, by The Municipal Journal Publishing Co.
† Engineering Editor, MUNICIPAL JOURNAL AND ENGINEER.

eral German authorities in support. In the old Roman mortars which he had analyzed, the whole of the lime was found in the form of carbonate, without any trace of silica combined therewith. While it may be true that some analysts have found more or less silica combined with the lime of ancient mortars, yet it must be remembered that such silica may have been contained in the original lime, as is the case with the product obtained at the present time by burning many varieties of limestone.

Portland and natural cements, on the other hand, set and harden under conditions which preclude the possibility of their receiving adventitious aid from either carbonic acid or insoluble silica, since these processes take place as well in a vacuum as in the open air, and whether the surface be glass, iron, stone or brick; therefore Reid regarded them as being partly chemical and partly mechanical in nature. In somewhat vague terms he refers to the action of the silicates of lime and alumina, and to the fact that "an addition of soluble silicate of potash or soda imparts increased initial strength to cement, but probably without improving its ultimate induration"; also that "unless the mass remains undisturbed, the natural cohesion and adhesive forces are unable to exert their beneficial influence, and perfect crystallization is impossible." From descriptions of this kind a clear conception of the processes cannot be obtained.

In his work entitled "Notes on Concrete," London, 1894, Newman states that as a rule quick-setting cements are inferior in ultimate strength to the slow-setting ones, and advances the following reason therefor:—While the mortar is setting, some of the lime is liberated from combination (as indicated by the reactions formulated by Le Chatelier and others); this results in the production of particles of different specific gravity, and causes a process of mechanical settling to take place which ceases when the mass sets. The chemical process, which is regarded as the formation of a hydrated compound silicate, then continues to complete the induration. It is evident that the longer the mechanical settling action proceeds, the denser will the material become, and therefore also the stronger. A true cement has been described as a substance which solidifies its water of hydration without going into a powder. Generally, a light, quick-setting cement does not retain sufficient moisture to enable the crystallization to be properly effected, and hence a Portland cement of high specific gravity is required in order that it may become thoroughly indurated. This description is also unsatisfactory.

In the edition of the "Encyclopedia Brittanica" of 1902, in describing cements, Blount states that the setting of common lime mortar is due solely to the physical process of drying, and that no chemical action takes place between the lime and the sand. The sand in such mortar is simply a dilutent to prevent undue shrinkage and cracking of the mass while drying. The subsequent hardening is caused by the gradual absorption of carbonic acid from the air by the lime, but this action is only superficial. In opposition to this latter statement, we have the results of several analyses of ancient lime mortars, which indicate that in the course of time the carbonic acid penetrates deeply into the mass, as will be seen from the table presented further on.

Referring to hydraulic cements, he states that if fat lime is mixed in the presence of water with silica in an active (amorphous and generally hydrated) form, or with a natural silicate containing silica in such form, it will combine into silicate of lime capable of resisting decomposition by water, and thus produce a puzzolanic cement. Were it not for the relatively high cost of artificially prepared hydrated silica and natural substances composed largely of silica in the active form, such as kieselguhr, which is in great demand for making dynamite, good cements of this class might be manufactured in a very simple manner. Under existing conditions, however, it is expedient to make use of cheaper materials like trass, blast-furnace slag, etc. Such cements are little used in England, and in general they are only of local importance, their cheapness depending largely on the availability of suitable natural deposits of volcanic origin.

Portland cement is an entirely different product. It is not a mechanical mixture of lime and active silica, ready to unite in the presence of water, but consists of definite chemical compounds of lime, silica and alumina, which, when mixed with water, combine therewith to form crystalline substances of great strength, and capable of adhering firmly to clean, inert materials, such as sand, stone and brick. Blount also states that the most trustworthy investigations of the constitution of cement clinker are those of Le Chatelier and Newberry, and gives a brief outline of the reactions of setting which have been set forth in detail in preceding chapters.

French Authorities

Although the work of Le Chatelier is most frequently cited by recent writers on calcareous cements, it is proper to state that the subject has also been studied thoroughly by a number of other French investigators; and as their views of the processes of setting and hardening are in some instances at variance, it may be of interest to read the following conclusions reached by Debauve in his large treatise entitled "Procédés et Matériaux de Construction," Paris, 1894, after consfdering some of the conflicting theories.

All chemists agree in recognizing the great influence of gelatinous silica in cements, but the hydraulicity of the aluminates of lime does not seem to be confirmed. These aluminates are not a necessary constituent of a good hydraulic binding material or matrix, although it appears from Landrin's investigations that they accelerate the setting process. The final hardening of the mass, on the other hand, is due exclusively to the silicates. Merceron, however, rejects the chemical reactions, and contends that hydraulic hardening is simply a physical process, analogous to that which has resulted in the formation of sandstone in nature, such stone being merely an agglomeration of grains of sand by means of gelatinous silica. In his opinion the hydration of the lime desiccates the gelatinous clay or silicate of alumina, which is then precipitated in solid form, and makes a kind of network in the mass, whose meshes enclose the particles of hydrated lime. This process causes the setting and initial hardening, while the subsequent hardening is due to the absorption of carbonic acid by the lime.

This simple and ingenious theory of Merceron affords a

good explanation of the various phases of hydraulicity, but it has not yet been confirmed, and must therefore stand merely as a hypothesis. It agrees, however, with the chemical theory which requires the presence of silica in a colloidal or gelatinous state, either isolated or associated with alumina, as being necessary to the formation of a hydraulic binding material. Silica that is not gelatinous is inert, and produces a weak mortar when mixed with lime. The action of the alumina in causing hydraulicity is not clearer than that of the silica, but its presence seems to favor the formation of gelatinous or active silica under the influence of heat, and it may thus contribute to produce or accelerate the setting process.

In regard to the progressive hardening of hydraulic cement, which process may continue for months and even years after setting, Debauve considers that the slow absorption of carbonic acid by the hydrated lime plays the principal part. This substance is always found in both air and water, and the contact of the mortar therewith is constantly renewed. From the surface it gradually penetrates the entire mass, until all of the lime is finally changed into the insoluble carbonate. If this did not take place, the relatively soluble hydrate of lime would disappear entirely in a comparatively short time from a submerged mass of mortar which is not protected by a preservative coating of some kind against the incessant action of the water. Such protection is developed in all hydraulic mortars by the setting.

German Authorities

In a paper in *Thonindustrie Zeitung* for 1895, p. 568, Dr. Tomei states that the nature of the constituents of Portland cement, and their rapid decomposition in contact with water, makes a direct examination of the process of setting and hardening almost impossible. The latter process can only be explained by a change of both chemical and physical constitution. By means of ammonium chloride in moderately strong solutions, he tried to dissolve the calcium oxide and carbonate from cement after different periods of induration, but the results were not very satisfactory, as it was difficult to determine whether the calcic aluminates and silicates were not also affected by the reagent.

The figures for the quantity of lime thus dissolved, however, indicate clearly that the chemical constitution of the cement varies considerably with the period of hardening, and especially in the case of mortars. For neat cement, the proportion of lime removed ranged from 43.5 per cent. at 7 days to 36.1 per cent. after 2 years, and for mortar made of one part cement to three parts sand, it ranged from 52.3 per cent. of the cement at 7 days, to 29.0 per cent. after 2 years. It also appears that in proportion as the quantity of carbonic acid in the mass increases with age, the amount of water of hydration reduces and the strength of the material becomes greater; furthermore, that the real hardening depends principally on the development of insoluble silicates.

Inasmuch as the percentage of lime dissolved from the mortar after two years was considerably less than that which was abstracted from the neat cement of the same age, Tomëi concluded that the silica of the sand had partly entered into chemical combination with the lime of the cement, and in confirmation thereof he stated that in very old cement mortars it has often been observed that the grains of sand cannot be distinguished, the entire mass having become homogeneous. On the other hand, the results indicate that the greater resistance of the neat cement to the solvent action of ammonium chloride, makes the use of a rich and dense mortar desirable in cases where concrete is exposed to ammoniacal liquids.

To test the behavior of the calcic aluminates, ferrites and silicates, he made a similar series of experiments with ammonium acetate as a solvent. The results showed that the lime becomes less soluble as the period of hardening increases, also that the silicates and aluminates become more stable, and that the silica particularly becomes more fixed; furthermore, that in the case of mortar, the cement combines chemically with the sand in the course of time, a marked difference in this respect being apparent between samples one and two years old. He also remarks that it is singular that such a considerable chemical change should occur so long after the initial hardening, but it shows that tests for tensile strength do afford a good criterion for a Portland cement, and that a guaranty of its durability is given only by its continual improvement in chemical composition in the course of years.

An important aid in recognizing such gradual improvement is the microscopical examination of thin sections of the indurated cement. In good material, we should see embedded in a mass of extremely small particles many transparent, vitreous bodies, which are probably colloidal hydrated silica, as they do not refract polarized light. With increasing age these bodies seem to become more refractive, and hence crystalline. We should also find frequently associated with them, numerous small plates or scales having crystalline edges, which are double refractive in polarized light. Tomëi therefore asserts that a physical, as well as a chemical, change takes place in cement in the course of time; also, that these facts establish the truth of Michaelis' theory that the binding substance in cement is primarily colloidal silica, but that this theory must be supplemented by the statement that such silica gradually becomes crystallized.

In a discuussion of the subject in 1903, Rohland refers to several other theories of setting and hardening, and concedes that the experimental evidence is decidedly in favor of assuming that cement undergoes a change of constitution in the processes, but he does not consider that any of the formulas proposed have been firmly established. The changes in hardening take place so slowly at ordinary temperatures that they cannot be followed with certainty from day to day, and to make them readily appreciable the material must be reduced to the finest powder. Moreover, much depends on the temperature and duration of the process of calcination, as it is known that the density of lime increases with these two factors, while its tendency to react with water decreases with the temperature.

The silicates, on the other hand, become less dense and react more energetically as the temperature rises. This fact is of much significance in the formation of the con-

stituents of Portland cement at the usual temperature of about 1400° C., as the degree of reactional energy then attained governs the reactions which take place at ordinary temperatures in the setting and hardening process. By applying the thermodynamic principle of change in molecular composition by least compulsion to the components of cement while at the high temperature of calcination, it will be found that in all probability a dilute solid solution of free lime in the other constituents is formed at the point of sintering, or incipient fusion. Such a solution is to be regarded as a mutual molecular penetration, like that which occurs in the case of carbon and iron in the formation of hard steel. The molecular equilibrium established at high temperature between the relatively active silicious components and the relatively inert lime, is obviously broken when the substance cools and is brought in contact with water.

This concept of the constitution of Portland cement differs much from most of the other theories to which reference has been made. Up to the present time, it has been impossible to determine accurately the proportion of free or uncombined lime in good clinker, although some analysts have claimed that it amounts to 30 per cent. A similar uncertainty is attached to the chemical constitution of the substances called alit, belit, celit and felit, by Törnebohm. It is, however, certain that independently of the other processes which take place during the hardening of cement, the quantity of lime in solid solution governs the hardness and strength of the mass, since the amount thereof which is in an entirely free state causes disturbances called "blowing." Rohland has not developed his theory sufficiently to enable him to formulate definite reactions.

In conclusion, reference may also be made to the statements about the processes of setting and hardening by BÜSING and SCHUMANN in their treatise entitled "Der Portland Cement," Berlin, 1899. Like many other writers, these authors are of the opinion that all of the chemical reactions involved have not yet been definitely established, and therefore they allude only to those features which they regard as settled. Underburned cement is generally more quick-setting than that which is calcined at higher temperature, but there are numerous exceptions to this rule, depending on the composition of the raw materials. The time of setting is also greatly influenced by the fineness and age of the cement, as well as by the temperature of the water used in mixing, and that of the air or water in which the mass is afterward exposed. It is also certain that in hardening, the constituents of cement will enter into chemical combination with water; that if the process takes place under water, some of these constituents, or portions thereof, will be dissolved in the water; and that if the process takes place in the air, a large proportion of the lime will be converted into calcium carbonate. Both of these combinations contribute to increase the cohesion and strength of the mass, and under proper conditions its complete petrifaction will eventually result.

It has been deemed expedient to set forth in the foregoing a number of different theories of the setting and hardening of Portland cement, in order that the attention of those who examine and use this material in important constructions may be directed to the complex phenomena of the process. By increasing the number of competent observers who are acquainted with the researches and opinions of others, further investigation will be stimulated, and thereby many of the obscurities which now attend the subject will doubtless be removed.

(To be continued.)

MISDEMEANORS OF ACETYLENE

WHEN the yield of gas from an acetylene generator is deficient, the cause may usually be ascribed to one or more of five defects. These are: (1) a leaky apparatus; (2) the gas-holder may be too small; (3) too little water may be used, so that the carbide is not completely decomposed, or too much water may be present, and cause loss of gas by dissolution; (4) additions of certain substances and chemicals, such as calcium chloride, or common salt, to the water employed for decomposing the carbide, may prevent the reaction from being complete, or may make it proceed more slowly; (5) the carbide used may be bad, or naturally slow in decomposing.

Another trouble that occasionally occurs with acetylene is an insufficient degree of purification, which may arise from any of the following six causes: (1) The purifying or drying vessel may be too small. Moist acetylene is much more corrosive, and exhibits a lower illuminating power than the dry gas. (2) The washer may be too small. If the acetylene is not properly cooled, the purifying material may be seriously acted upon, and (if that material is of the bleaching powder type) compounds containing chlorine may be added to the gas. If the generator is also being driven too fast, danger may actually occur from this cause. When they are over-driven, or fed with granulated carbide, carbide-to-water generators may yield a gas containing 40 per cent. of the sulphur present. (3) If the temperature during generation is too high, complex organic compounds may be produced, which act injuriously on the service-pipes, etc., and ultimately cause leaks. If air is present in the apparatus, acetylene evolved at a high temperature may cause explosions. (4) Too small a generator may render the final gas impure. (5) Presence of too much air in the generator may impair the gas, especially if it is overheated, for a process of oxidation may go on. (6) Excessive pressure may injure the acetylene. "A word to the wise is sufficient."

MUNICIPAL ADVERTISING

The Art of Exploiting American Cities Much in Evidence—Canada Is Expert in Attracting Population to Particular Districts by Advertising

THE evolution of the art of advertising cities and states has gone on uninterruptedly for generations. In a recent issue of an interesting contemporary, *Printers' Ink*, the subject was treated systematically and somewhat exhaustively. It is pointed out that Chambers of Commerce, municipal authorities and others interested in seeing certain cities grow now realize that not natural advantages alone make growth, but also systematic activity in publishing those natural advantages in the proper quarters. Manufacturers come more quickly to an ideal industrial center when they know that cheap fuel, free sites, low taxes and freedom from labor annoyances are offered. Farmers can be brought into the wheat lands of Canada's Northwest Territory ten times as fast through active newspaper advertising of advantages and terms as they can by being left to learn about these advantages themselves. Some States and cities have beautiful scenery to attract tourists, while the climate of others is beneficial to invalids. Few localities, indeed, but have something to offer outsiders that will increase their prosperity and importance.

NOT ALWAYS SUCCESSFUL

Municipal advertising is not always successful and is frequently the result of impulse. A city wakes up to the fact that a neighboring municipality gets a good many conventions or new factories. In the spirit of emulation a fund is quickly raised and a committee appointed to compete. Started off with a spurt, the campaign often ends with a depleted treasury. The entire fund may have been invested in an expensive souvenior book that had no real advertising value. Or in the rivalry of bidding for a large convention the whole fund may have been pledged for entertainment purposes. If the advertising committee used the fund to seek manufacturers, it may have found the wrong kind—the manufacturer who secured a bonus for a wornout plant or who sold stock in a concern that was ridiculously overcapitalized. The moment a municipal advertising fund is raised it is made the object for the attack of enemies.

THE KIND OF MEDIUM TO BE USED

Municipal advertising is confined to no single set of mediums. In some cases the best results can only be secured through newspaper publicity. In others, the magazines may be the most profitable medium. In still others printed literature or personal letters reach the class to be interested, while many auxiliaries are employed, such as traveling exhibits of products, stereopticon lectures, etc. The first essential to good advertising is to have something to offer. The advertising should be constant, but sane.

For every dollar spent by the communities themselves in promotion there are ten spent by the railroads. Hardly a railroad corporation in the United States, great or small, but is using publicity to promote some particular section or class of business. The great West has been built up largely through the advertising of the railroads. Every line of this publicity has direct bearing on the growth of factories, the settlement of farm lands and the transactions in real estate.

There is an awakening among boards of trade and municipal officials on the subject and it is realized that efforts along the line of advertising should be begun with the cooperation of the railroads. In attracting conventions, tourists, factories, settlers or any class of people or business that are to benefit the community, the question of passenger or shipping rates arises. After they have been settled the community that proposes advertising can get much valuable help by adopting the railroad's knowledge of advertising methods. The quantity of railroad advertising appearing in the daily papers has increased ten fold since 1895. Every line tends to the upbuilding of the communities lying along the railroad's right of way.

PRINCIPLES TO BE FOLLOWED

The underlying principles to be followed in municipal advertising are not materially different from other lines of work. The first problem should be, what are the advantages offered? The second, to what class will these advantages appeal? A city or district has a character. If it is worthy of advertising effort it must have some especial advantage. Among the more common advantages are climate, improvements, shipping facilities and the present character of its inhabitants. These and many other conditions are fit subjects for advertising. The ordinary newspaper "write-up" or the ordinary illustrated booklet telling of the great smartness of some of the town's "leading citizens" is quite inefficient. The average newspaper writer cannot grasp the situation. The element of selfishness in human nature must be taken into account in municipal advertising. Few people select a factory site from the statements chronicled by newsvendors. The advertising must be explicit, direct. It must be devised with a full understanding of conditions. Boards of Trade and similar organizations are apt to delegate this work to some one able to dash off a lot of gushy matter. The prospective investor pays little attention to generalities, but if he has the facts presented in a logical, sensible way, he will read them and be interested.

The municipality must have something other than the mere desire to attract outside capital, residents or visitors. If it has an excuse for calling attention to itself nationally, some intrinsic value or advantage, then it can make splendid use of publicity. The work should be delegated to an experienced man, not a theorist, one who has observed the development of many municipalities. Take care of both the human side, the social side and the practical side of your prospective customer and you will get him to locate with you. He will build his shops in your midst and thereby benefit the entire community. Get him into the notion that he is going to have the hearty co-operation and support of good citizens and that the town will take an interest in his affairs and help in every legitimate way to promote his wel-

fare. He wants to make money, live in a good community surrounded by cheerful, optimistic people, and it is the business of the Board of Trade to set the facts before him in the best possible light.

A Successful Instance

As an instance of the possibility of getting good results from a modest outlay, the exhibit of Nebraska at the World's Fair at St. Louis affords a good example. The appropriation was only $35,000, which made a state building possible, but by careful management and the intelligent work of the commission the State of Nebraska has been given a representation at the Fair which ranks first in point of advertising value. The main exhibit is in the Agricultural Building. A complete little theatre has been built in the center of the exhibit, equipped with a stage. Exhibitions lasting fifteen minutes are given thirteen times a day so that fully 3000 people witness the exhibition daily. The Nebraska exhibits are more frequently mentioned in the press than those of any other state.

Louisville's Method of Advertising

In the street cars of St. Louis during the Fair, have appeared cards calling attention to the advantages of Louisville, Ky., as a manufacturing center. The public is invited to visit the Kentucky Building, the Kentucky exhibits and to correspond with the Commercial Club of Louisville for any further information that may be desired. The Commercial Club pays for this sensible form of municipal advertising.

Making use of conventions as a form of municipal advertising has much to recommend it in some cases. Conventions are of the highest possible advertising value to a city that has real advantages to show, but not every city has them. The methods of obtaining conventions are admirably exemplified in the experience of Detroit and Niagara Falls, both successful convention cities.

Canada and the great Canadian West offers a splendid illustration of the benefits of what may be called territorial advertising. Municipal advertising has reached an excellent state of development in England. The town of Blackpool in Lancashire and the Isle of Man each have an advertising manager whose sole duty is to exploit these sections, but it is on this side of the Atlantic that the art of municipal advertising has reached its highest development.

MUNICIPAL TAXATION *

Constitutional Limitations and Apportionment of State Taxes—Local Taxation Complicated by State Taxation—Separation of Land and Building Values

By Lawson Purdy

By statute the general property tax prevails throughout the United States, with very few exceptions, and local revenue is supposed to be raised by a uniform tax equally imposed on all property. This system is based on the theory that in order to be equal, taxation must be equally imposed on everything that has value. To-day the theory is completely discredited. Hardly a voice is raised in its favor, and the so-called system is a wreck, only held together at all by constitutional restrictions and inherited prejudices. The first problem that confronts us is how to give the general property tax a decent burial.

Constitutional Limitations

The constitutions of at least twenty-four States contain limitations upon the power of the legislature which render impossible the adoption of any sensible system of taxation. The constitution of Ohio is as bad as the worst, and contains a typical restriction:—"Taxes must be equal and uniform, and imposed on all property both real and personal." The constitution of the United States protects our fundamental rights, and protects them adequately. The first step forward in all the States of the Union but eight should be an amendment to the constitution eliminating all matter relating to taxation.

Local taxation is complicated by State taxation, chiefly because in most of the States a tax is imposed for State purposes upon property as assessed by local officials. This leads to undervaluation by local assessors so as to reduce their share of the State revenue. Sometimes the revenue is excessive and there is a mad scramble for appropriations which it is difficult to cut down when hard times reduce the State's income. Sometimes the revenue is insufficient and the legislatures strive to invent new taxes, generally bad ones, and disturb the business conditions.

Apportionment of State Taxes

At least part of the State revenue should always be raised by an elastic form of taxation which can be increased or diminished in accordance with the need for revenue, and whose incidence will be felt by the taxpayers. Such an elastic system was proposed four years ago by the New York Tax Reform Association, and endorsed by the New York Chamber of Commerce and other bodies. It provides for the apportionment of so much State revenue as may be required in excess of that derived from special taxes, to the several counties of the State in proportion to the revenue raised for all purposes by and within each county.

The tendency to economical administration of local affairs which would result from the apportionment of State taxes on the basis of local revenue is a desirable feature of this method of apportioning the burden of supporting the State. In the State of New York all the expenses of the State are only about 15 per cent. as much as the total expense of supporting local governments. There are very few States in which more than one dollar in seven is required for State purposes, and in many States a large part of the State revenue is not raised by special taxes.

Reform in Local Taxation

When constitutional limitations are removed and State revenue is provided without the imposition of a State tax on

* From an address delivered at the last meeting of the National Municipal League.—[Editor.

property as assessed by local officials, the way is clear for needed changes in the methods of raising local revenue.

The chief source of local revenue is now and always will be the taxation of real estate. Real estate now pays from 75 per cent. to 99 per cent. of all local revenue. On this account alone it is of the utmost importance that the assessment of real estate should be as nearly equitable as human machinery can make it. The prevailing practice of disobedience to the law, which requires assessment at full value, or market value, or cash value, renders an equitable assessment an impossibility. After a long struggle the policy has been adopted in the City of New York of assessing real estate as the law directs, and in spite of an insufficient appropriation and a very inadequate number of assessors, the improvement effected in two years has been tremendous.

The criticisms of real estate men really relate to details, and not to the principle. They complain that there are not enough assessors; that they are not sufficiently paid; and that the work cannot, under these circumstances, be accurately performed. All this is true, and the next step in the City of New York must be to secure a much larger appropriation for the Tax Department and increase the number of assessors and the salaries of the chief deputies.

In the City of New York we have only two columns of the record for values, in which are set down the land value and the total real estate value. This is an economy of clerical labor, and, we believe, positively exerts an influence on the assessors to keep them from over-valuing buildings. Even under our New York plan of separately stating the land value and not the improvement value, it is evident that buildings have been over-valued in proportion to the land. A comparison with results in Boston, where assessments are well made, leads to the belief, however, that buildings are less over-valued in the city of New York than they are in Boston.

A still further improvement was effected by an amendment to the city charter which requires the publication annually of the complete record of real estate assessments. The publication will be made by sections into which the city is divided for the purposes of assessment. Each section contains from ten to thirty thousand parcels, and will be published separately; and persons interested can buy, for a few cents, the assessment roll of one or more sections, or of the whole city.

Local Option

The removal of constitutional restrictions and the abolition of a State tax on all property locally assessed will make possible a reform without which progress is well-nigh impossible. In every State we are attempting to tax property which ought never to be taxed at all. On this subject city sentiment is naturally far in advance of country sentiment; yet country sentiment rules our legislatures. With local option progressive communities will furnish object lessons to the unprogressive, and progress will be rapid.

The few adherents of the general property tax theory always excuse a failure of the law on the ground that it is not sufficiently stringent. They are generally very ignorant of the lessons of experience, or are so wedded to a theory that they refuse to accept any experience as a guide to action.

In Ohio they have the most efficient and minute scheme of assessing all classes of property which has been devised in any State. Every citizen is bound under oath to make a complete return of his property in detail. If he declines to make the statement required by law, a penalty of 50 per cent. is added. In addition to this they have what is called the tax inquisitor law, which gives the county commissioners power to make contracts with persons who may give information which will result in personal property being placed on the assessment roll. The result of the severe listing law and the tax iniquisitor law has been the steady shrinkage in the assessed value of personal property.

In 1893 the Hon. William McKinley, then Governor of the State, appointed a tax commission of four members, two being Republicans and two Democrats, who when appointed expressed themselves as in favor of continuing the tax upon personal property.

The Hon. E. A. Angell, who was a member of the Ohio State Tax Commission, said:

"It is evident at once that the informer scheme does not make the general property tax effective. It has utterly broken down in Ohio as elsewhere. The merest bagatelle is reached outside of visible, tangible property."

Taxation of Debts

In the State of New York the rural constituencies still cling to the taxation of debts secured by mortgage of real estate, in spite of the fact that the taxation of mortgage debts is about the meanest kind of double taxation there is.

The impression prevails in some quarters that the exemption of mortgage debts from taxation would be a special benefit to those who lend money. So far from this being the case it seems probable that many who lend money on mortgage security and escape taxation, would really receive a smaller net return by reason of the greater competition in the lending of money. The benefits would be so widely diffused that all classes in the community would share in them.

The slow progress we are making in reforming methods of taxation is due far more to ignorance than to any conflict of interest. What we need is smaller constituencies to educate, and object lessons which will educate the rest of the people by sheer compulsion.

In conclusion I will sum up the steps which lead to the shortest, easiest way to improve our local tax systems.

Abolish all constitutional restrictions on the power of the legislature to regulate taxation.

Do away with the necessity for uniform State taxation by apportioning State taxes in proportion to local revenue.

Give to every county the right within the general laws of the State to exempt from taxation any class of property, or to proportionately reduce the assessment of any class of property.

As an immediate reform assess real estate annually, state the value of land separately and publish the assessment rolls in a convenient form.

With local option every community will be a debating society, and education which now halts and stumbles will advance with leaps and bounds. People who now fail to understand that taxation is of importance to them will demand enlightenment. The progress of a decade will exceed all the progress of the past one hundred years.

MUNICIPAL TELEPHONY IN ENGLAND*

The System Has Come to Stay—But One in One Hundred Subscribers Favor the "Company's" Service

By E. Dagger

MUNICIPAL telephone systems in Great Britain are increasing in number and so far the results have been most encouraging. Municipal exchanges are in operation, or in course of construction, at Glasgow, Portsmouth, Brighton, Swansea, and Hull. The Glasgow system which first gave service in March, 1901, has now in operation 11,500 telephones, the average revenue per telephone being $21. To compare this revenue with Canadian rates ten per cent. royality paid to the British Post Office must be deducted, which reduces the average receipts per telephone to $18.90 per annum. This exceedingly small charge to subscribers has enabled the municipality to meet all operating and maintenance expenses, leaving a balance sufficient to provide for interest and sinking fund, and to set aside a surplus of $17,775.50 for depreciation.

Regarding the quality of the Glasgow municipal system the following statement by Frederick M. Adams in the Brooklyn "Eagle" should be sufficiently convincing:

"The Glasgow telephone service is the best I have ever inspected. Mr. Bennett informed me that statistics showed that the average time required to make a connection was less than fifteen seconds. It should be explained that the telephone booth is practically unknown in the office of a Glasgow business man. The instrument is on the edge of his desk, and the receiver and transmitter are in one piece. This aluminum device is connected with a wire cord, and the customer may converse leaning back in his chair or walking about the room, as he prefers. It is a most decided improvement over the clumsy and antiquated system which yet prevails in most exchanges in the United States."

In speaking of Glasgow rates, Mr. Adams says: "Permit me to make a contrast. I live in a suburb of New York City and it costs me forty cents to telephone to any part of the city, and fifty cents to get a connection with Brooklyn. Newark, New Jersey, is only twenty-five miles away, and the rate is seventy-five cents for a few minutes conversation."

The following figures, taken from the report of the Corporation Telephone Department for the year ending May 31, last, make an interesting study, and it will be noted that the financial position of the undertaking is growing stronger each year. In a few years we may look forward to a reduction of the already low rates:

	1902	1903	1904
Capital expenditure	$938,415	$1,319,468	$1,526,208
Average cost per station (including spare plant and preliminary expenses	171 26	144 65	136 67
Amount borrowed and not repaid	902,809	1,181,136	1,390,336
Gross revenue	129,118	271,400	359,450
Rentals, carried forward to following year	60,471	100,882	117,708
Net revenue	68,647	170,518	241,742
Total expenditure	66,709	162,268	224,020
Net revenue per station	12 53	18 67	20 95
Public telephone receipts	141 23	1,095 75	3,779 12
Working expenses	33,272	77,764	112,760
Interest paid	13,061	32,347	41,575
Sinking fund paid	9,545	28,275	40,630
Depreciation fund	1,938	8,250	17,776
Loss on terminal fees remitted to subscribers	3,531	5,508	1,456
Royalty to Post Office	6,716	16,582	24,384
Total expenditure	66,709	162,268	224,020
Total expenditure per station	12 18	17 79	19 63
	Per cent.	Per cent.	Per cent.
Percentage of Sinking Fund, plus Depreciation Fund, to total expenditure	3.93	4.2	4.67
Percentage of total expenditure to net revenue	91.17	95.16	92.66
Percentage of net revenue to capital expenditure	7.31	12.92	15.44
Percentage of outstanding rentals to gross rentals	13.95	9.91	7.44

The foregoing figures furnish details of the plant as originally estimated for, and that actually constructed from year to year; the figures in the last column representing the capital expenditure of $1,526,208.

	Original Estimate.	1901-2.	1902-3.	1903-4.
Completed stations	5,250	5,479	9,122	11,405
Partially completed lines	1,200	8,787	7,387	9,065
Switchboard capacity	6,050	7,060	10,826	12,062
Pairs of wire in cables	6,450	14,572	18,171	21,874
Miles of pairs of wire in cables	4,933	11,061	14,029	17,597
Miles of trenching	22	94	128	143
Ducts going out of exchange	32	126	135	150
Capacity of ducts in pairs of wires	6,900	27,000	31,000	36,000
Miles of duct	32	104	127	140
Miles of underground cable	31	114	162	206
Poles in ground	2,326	691	1,799	2,544
Iron standards on roofs	456	228	243	239

It may be added that, with the exception of the new London post-office telephone system, the Glasgow municipal plant is the largest underground service in the United Kingdom.

Second in importance among municipal telephone systems is that of Portsmouth, which was opened in March, 1903. The results achieved with this exchange are interesting as proving how worthless are opinions of experts whose evidence is put forward by the monopolies for the purpose of preventing the establishment of municipal undertakings. At the Portsmouth local Government board inquiry two witnesses were put forward by the National Telephone Company to oppose the granting of borrowing powers to build the plant. There were J. E. Kingsbury, English manager for the Western Electric Company of Chicago, a "Bell" corporation, and Herbert Laws Webb, late engineer to the New York Telephone Company (also "Bell"). The following are extracts from their evidence:

Q. In your view, will this business be a financial success?

A. (J. E. Kingsbury): No; I do not see how it can.

Q. Do you think it commercially sound?

A. I think it quite uncommercial.

Q. Are the (proposed) rates remunerative?

A. (H. L. Webb): I do not think that they can possibly be remunerative.

* F. Dagger, Telephone Engineer, Toronto, in *The Canadian Engineer.*

Q. Will the undertaking be a charge on the rates?

A. I think it will be a charge on the rates.

Notwithstanding these gloomy predictions Portsmouth comes out with a surplus such as they did not get on their electric lighting scheme until it had been working several years. The rates charged are, per annum: Unlimited service, $28.61; measured service, $17.05 and one cent per outgoing call; or $12.18 and two cents per outgoing call. The receipts for the year ending March 31st last averaged $17.54, or, with the post-office royalty deducted, $15.79 per telephone. The gross revenue was $29,137, and after paying operating and maintenance expenses, post-office royalty and Government long distance charges the net revenue amounted to $13,095, or equivalent to a dividend of over nine per cent. on the capital expended, $141,230. After paying interest and sinking fund a surplus of $6,136 remained, which has been set aside towards a depreciation fund.

At the Swansea municipal exchange the rates are the same as at Portsmouth, and the latest available returns show 750 subscribers connected, while 205 additional orders were on the books. The borough accountant recently prepared a report showing the cost of the present plant for 1,000 lines to be $98,861, or $98.86 per subscriber; the first year's revenue to average (including ten per cent. post-office royalty) $19.50 per telephone; the cost of operation and maintenance, royalties, interest and sinking fund, $18,316, leaving an estimated surplus of $1,184. These figures were based on eight months' actual working.

The Brighton municipal exchange was opened in November last, so there are not yet any accounts available. The rate for unlimited service is $26.80 per annum; the number of subscribers, 800. The whole of the plant in the town is underground, poles being used only for country services. There has been considerable controversy in regard to the respective merits of the competing services in Brighton. The National Telephone Company has recently installed the latest "central energy" system now in use in the large "Bell" exchanges in the United States and Canada, and the company's officials have frequently asserted that the municipal service was "inferior and inefficient." As a result of this, A. R. Bennett, the engineer of the municipal system, issued inquiry cards on the subject to all subscribers having the telephones of both systems, and the following is a summary of the replies received:

In favor of municipal service, 398; in favor of "company's" service, 5; no difference, 12; satisfied with municipal, but expressed no opinion about company, 28; uncertain, 4. Total, 447.

Eighty-four of the 398 emphasized their verdict by such remarks as "By far," "Most decidedly," "They cannot be compared," "Municipal the only efficient and trustworthy one," "Most emphatically," "Without hesitation," "By a very long way," "Unquestionably," "Without doubt," "Absolutely the very best," etc.

The Hull municipal exchange will be in operation very shortly. The rates are: Unlimited service, $30.68 per annum; second and subsequent connections of the same firm, $28; measured service, $14.61 and two cents per outgoing call. There are over one thousand subscribers, and additional contracts are coming in rapidly. Practically the whole of the members of two of the principal industries of the port have signed municipal telephone contracts.

Municipal telephony in Great Britain has evidently come to stay, and the results up to date will make it exceedingly difficult for its opponents to produce arguments sufficiently convincing to stem the tide in its favor.

PROPOSED IMPROVEMENTS IN NEW ORLEANS

City Engineer W. J. Hardee, of New Orleans, has just completed the plans and estimate of cost for contemplated improvements at West End, as projected by himself, that the Railways Company requested him to compile on the occasion of the inspection of West End by the Mayor, Mr. E. C. Foster, president of the Railways Company; Mr. Hardee and a committee of the City Council. The plans are given in the minutest detail, together with the cost of each item, Mr. Hardee having gone to much trouble in getting the estimates, that his report might be a complete one. The projected improvements would make of West End one of the most beautiful resorts in America, at a carefully calculated total cost of a little over $230,000.

After describing the West End as it is to-day and pointing out the objectionable features that call loudest for improvement, Mr. Hardee says: "Having duly considered the foregoing conditions, and having in view to provide a place of recreation and amusement for our people, not only of to-day, but for those of a few years hence, when it is confidently believed the population of New Orleans will be doubled, I have conceived a project for improving West End that will, I believe, eliminate all undesirable existing conditions and convert it into one of the, if not the, most beautiful and attractive places in America.

"That project includes the improvement of the lake shore, from the New Basin Canal to the Upperline Canal; the improving of the eastern bank of the Upperline Canal, from the lake shore to the existing Revetment Levee; the improving of the existing Revetment Levee from the Upperline Canal to the New Basin Canal; the improving of the body of water bounded by the New Basin Canal, the lake shore, the Upperline Canal and the Revetment Levee; the creating of a park 500 feet wide, and extending from the New Basin Canal to the Upperline Canal, in front of the existing Revetment Levee; the erecting of a wharf, twenty feet wide and 500 feet long, in front of the park; the erecting of a pier 100 feet square at the end of the wharf, and the erecting of an ornamental pavilion sixty feet square on the pier."

The project is predicated on the condition that the city of New Orleans shall secure from the New Basin Canal and Shellroad Board the dedication, for a period of fifty years, for public park purposes, of the western bank of the New Basin Canal, from and including the existing Revetment Levee, to the north limits of the proposed park, the purchaser of the franchise having complete control of all improvements for that time, and then reverting to the city, without cost, at the expiration of the time.

SEPTIC TANK SEWAGE DISPOSAL*

Record of Six Years of Experience of the Septic Tank Sewage Disposal System of Scotland—Practical Working of the System.

By Ex-Provost Shanks

The object of the present paper is not to enter into a discussion of the merits of the bacterial system of sewage disposal, as it has been repeatedly done at these Congresses, both from a practical and a scientific point of view by thoroughly competent authorities, but rather to give an account of the practical working of the septic tank system as installed in connection with the Burgh of Barrhead. It will be unnecessary that I should detail the considerations that led the Barrhead Council to adopt the system. Suffice it to say that, having carefully considered as far as possible methods of chemical precipitation, they became convinced that the septic tank system was unquestionably the best suited to the requirements and conditions of the place, and accordingly it was adopted. The results have been entirely satisfactory to the municipality, and as the years pass nothing transpires in connection with the working of the system to show that its adoption was anything but a wise choice.

The works were opened formally on June 15th, 1899, and they had been in use in a more or less complete fashion for about a year previous to that date, so that now we have a record of about six years' working. They were designed to serve a population of 10,000, and to purify a maximum flow of 400,000 gallons, i. e., 40 gallons per day per head of the population.

Domestic Sewage and Roof Water

One point of importance has to be noted, viz., that they deal with domestic sewage and a proportion of roof water only. We have a separate system for surface water, which is carried direct into the river without purification of any kind. There are a number of calico printing works and bleach works in the vicinity, where large quantities of water are used. The effluents from these works, i. e., the manufacturing effluents, are not dealt with in the sewage works, but are discharged into the stream. To have taken these effluents would have involved enormous extension of the works, and as the stream was already rendered impure by the works outside of the burgh, this extension was regarded as unnecessary. The discharge from the works referred to is not sewage-bearing to any extent, but contains chiefly dye stuffs, alkalies, etc., so that the stream, although often deeply colored, is not noxious. In dry weather, therefore, we have to deal with only sewage, and during wet weather sewage plus roof water.

The works consist of two grit chambers, four septic tanks and eight aërating bacterial filters, all of which are built in concrete. The main outfall sewer discharges into the grit chambers, from which the sewage passes without being screened into the septic tanks, in which the solid impurities of the sewage are liquefied. The effluent, thus freed of solid matter, passes out through a slotted pipe at the end of each tank into the effluent collecting channel. From this it flows through the modules and aërators to the admission valve chambers of the filters.

Each of the septic tanks is 100 feet long by 18 feet wide by 7 feet deep at low water, and is entirely covered with concrete arches carried by rolled steel joists and brick piers. The four tanks when filled to low-water level contain about 312,500 gallons. The sewage in the tanks may rise 18 inches above the low-water level, an additional capacity of about 70,000 gallons being thus brought into play to enable them to cope with sudden rushes of storm water. In spite of variations in the flow to the tanks, the quantity passing to the filters is maintained constant by means of two regulating modules.

The Working Set of Filters

Each filter is 55 feet long by 54 feet wide, and is filled to a depth of 4 feet with broken furnace clinker, which constitutes the filtering material. The total filtering material area is about 2540 square yards.

Six of the filters ordinarily form the working set, the other two being held in reserve. The tank effluent is supplied to one filter at a time, and is distributed over the surface of the filtering material by a system of stoneware distributing channels laid thereon.

The discharge valve is closed meanwhile, so that the interstices of the filtering material become filled with the tank effluent. The effluent remains in the filters for about one hour and a half, during which the dissolved impurities are oxidized by the bacteria attached to the filtering medium. The discharge valve is then opened, when the filtering effluent escapes, drawing down after it a supply of air into every crevice of the filter. The latter is then left to drain and aërate while the other working filters are filled in turn, after which it is again filled.

Automatic Gearing

The alternation of the filters is accomplished by a system of automatic gearing which works very well, provided the apparatus is kept clean. That is to say, the gearing is automatic until it gets clogged, and this tendency involves naturally regular attendance of a man on the works. It is only fair to say that the Barrhead gearing was the first of the type made by the designers, and doubtless the details have now been considerably improved. As matters stand, however, we have nothing to complain of, because in any case there are many duties for a man to perform in connection with such works, and keeping the gear clean is but one of these duties. When the works were instituted we had the idea that with perfectly automatic gear and a continuous system that performed its work with gradually increasing efficiency, we should be able to leave the works without any attendance, and so have no annual cost at all except the capital charges. This, we discovered, was too much to expect, and we have a man almost constantly on the works at a cost

* Paper read at the Sanitary Congress, Glasgow, Scotland, 1904.

of £60 per annum. The fact that it was a new scheme, and there was not much experience to guide us, probably increased the cost of the installation and led to certain difficulties that we experienced at the outset. The difficulty with the gearing I have already referred to, and the other was the filtering material. The contractor rather scamped this part of the work, and instead of putting in hard furnace clinker he mixed it with a good deal of fine ash dust, and we were very soon troubled with clogging of the filters. The surface got covered over with a mouldy scum, and had to be regularly turned over with a spade. We afterwards replaced the filtering material in four of the filters with harder and rougher clinker, free from dust, and these have been in use now for three or four years. The other four filters, however, remain as they were at first, and although they still require periodical turning over on the surface, they do not seem to have lost their filtering capacity to any extent and produce without fail an excellent effluent. They have been working, too, at their full capacity almost all the time, as we have found during the past two years that even in dry weather the flow of sewage has been great enough to employ the full capacity of the works. This means that we are purifying more than forty gallons per head of the population.

Total Cost of Works

It may be interesting to indicate at this point the total cost of the works:—

Land	$5000
Works	28,880
Total	$33,880

The sum mentioned for land is merely an allocation, as it was necessary to purchase a property at a cost of $20,000, with a rent roll of over $1000 per annum. The rents pay the interest on the capital sum, and there is a considerable extent of spare land, so that the allocation of $5000 for the works may be regarded as a fair estimate. The cost of the works includes the charges of the Septic Tank Company.

The sewerage rate at present is 20 cents, and I estimate that less than one-third of this is applicable to the purification works; 6½ cents would be sufficient to cover the annual charges, including interest on capital, repayment of loans, and working expenses. The working expenses, including labor, implements, repairs, etc., do not amount to more than $400 per annum, which, it must be acknowledged, is a small sum for a population of 10,000, and an assessable rental of $165,000. The remainder of the 6½ cents is absorbed in interest and repayment of capital, and as the latter must be repaid in thirty years, it will be seen that the interest charge annually decreases until at the end of the period referred to both capital and interest disappear.

It will thus appear that after the capital is repaid the sewage of the town will be purified at quite a nominal cost—not much more than a cent in $5, per annum.

No Loss of Efficiency

It does not appear that the works have lost efficiency in any respect. The clogging of the filters to which I have referred does not seem to have been anything but superficial, and the moment the superficial scum is broken the filtration goes on with the same rapidity, and we are not able to detect any diminution in the capacity of the filters. I recently dug up a patch of the filtering material right to the bottom of the filter, and it had simply the appearance of wet dirty ashes or furnace clinker. Although there was too much fine ash in it, as I have already explained, the clinker and cinder did not appear to have been affected or broken up as the result of its six years' use. In one of the filters I observed a large number of ordinary earth worms. What their function in the filters may be I cannot say, but doubtless they perform some part in the process of purification. The septic tanks have continued to perform their share of the purification without interruption and without interference of any kind. They have never been cleaned out, and as far as we can judge, may never require to be. At the end of the tanks where the sewage enters there is no scum on the top, nor does there appear to be any sludge at the bottom. At the end next the filters, however, there is a thick scum on the top, probably 1 inch in depth, with a variegated mouldy-looking surface. The sludge at this end is about 3 feet deep, and appears to be of the consistency of a thin black mud. Whether this will ultimately gather to such an extent as to necessitate cleaning out I cannot say, but that it has not been cleaned out in six years of continuous working is satisfactory evidence of the efficient working of the tank. It has to be borne in mind that we do not allow road detritus or insoluble grit to enter the tanks. That is caught in the grit chamber referred to in the description already given. This chamber, as you will have noted, is of comparatively small dimensions, and the cleaning out is not a serious matter. It is done by the man on the works two or three times a year, and the refuse being trifling in quantity is easily disposed of.

Character of the Effluent

The next question of interest is that of the character of the effluent. It has always been good enough for our requirements, being cleaner than the stream into which it was discharged, and there never has been any evidence of subsequent putrefaction. It is always in appearance like clean water and absolutely without smell.

Following is an average of analyses made in 1899, samples having been taken in June, July, and September of that year:—

	Parts per 100,000.	
	Tank effluent.	Filtrate.
Suspended matter—		
Organic matter	7.783	1.015
Mineral matter	8.000	0.559
Total	15.783	1.574
In solution—		
Organic	12.357	16.309
Mineral	20.714	24.88
Total	33.071	41.139
Free ammonia	2.200	0.93
Albuminoid ammonia	0.237	0.11
Total	2.437	1.04
Chlorine	5.09	5.06
Equal to chloride of sodium	8.43	8.31
Nitrogen as nitrates	Nil	0.676
Oxygen absorbed	1.49	0.429

Amount of purification shown in this table is, in respect of albuminoid ammonia, 53.5 per cent.; oxygen absorbed 71 per cent.

AVERAGE OF ANALYSES

It will be observed in the above analyses that no samples were taken of the crude sewage, and it appears to me that percentages of purification, based upon samples of crude sewage, are not very instructive, for the simple reason that in taking samples of sewage you may chance to get a large proportion of solid matter, and, on the other hand, you may avoid it. The effluent from the septic tank is naturally pretty uniform, and gives a better average of the character of the sewage than anything taken from the sewer. The average of analyses here given indicates, as far as I can judge, a very satisfactory percentage of purification. The oxygen absorbed by organic matter in the filtrate is very low, and the amount of nitrogen indicates that the process of purification has been quite satisfactory.

The following table gives the average of results of analyses of crude sewage, tank effluent, and filtrate made by Messrs. Dibdin and Thudichum, of London. The samples were taken on February 18th, 19th and 20th, 1901:—

	Calculated in parts per 100,000.		
	Crude sewage.	Tank effluent.	Filtrate.
Suspended matter—			
Organic	20.3	3.0	
Mineral	7.1	2.85	faint trace
Total	27.4	6.0	
In solution—			
Organic	17.3	17.3	15.8
Mineral	31.1	30.3	23.8
Total	48.4	47.6	39.6
Free ammonia	3.34	2.85	1.21
Albuminoid ammonia	0.337	0.327	0.126
Total	3.680	3.181	1.337
Chlorine	5.3	5.0	4.94
Nitrogen as nitrates	nil	nil	0.837
Nitrites	"	"	trace
Oxygen absorbed in four hours	3.56	2.85	0.86

The sewage samples are weak and cannot be regarded as representative of the sewage as a whole.

The effluents were simply opalescent in color. They had no odor and underwent no putrefaction. The average amount of purification was:—

	Tank.	Tank and filters.
Albuminoid ammonia	4.3	62.7 per cent.
Oxygen absorbed	19.7	75.5 per cent.

In April of this year I had a fresh set of samples taken, and had analyses made from these samples by Messrs. R. R. Tatlock and Thomson, analytical chemists, Glasgow. On this occasion samples of crude sewage were taken, as well as samples of the tank effluent and the filtrate.

Report on Samples of Sewage taken from the Barrhead Sewage Disposal Works in April, 1904.

	Parts per 100,000.		
	Crude sewage taken from main sewer.	Tank effluent.	Filtrate.
In solution—			
Mineral matter	53.14	29.86	31.54
Organic and volatile matter	10.86	11.35	2.74
Total solid matter	64.00	41.21	34.28
Free ammonia	2.63	2.61	0.854
Albuminoid ammonia	0.30	0.34	0.052
Total ammonia	2.93	2.95	0.865
Nitrogen as nitrates and nitrites	nil	nil	0.918
Oxygen absorbed by organic matter	2.83	3.06	0.67
Chlorine	3.60	4.97	4.97
Equal to chloride of sodium	5.93	8.19	8.19
Color (Loch Katrine water equals 10)	25	20	7
In suspension—			
Mineral matter	29.60	2.80	
Organic matter	22.91	5.17	
Total	52.51	7.97	trace

Amount of purification shown in the filtrate, as compared with tank effluent, is: Albuminoid ammonia, 84.7 per cent.; oxygen absorbed, 78 per cent.

PERCENTAGE OF PURIFICATION

It will be observed from these analyses that there is no falling off in the efficiency of the purification of works. The percentage of purification seems to have steadily increased. The filtrate appears to me to be exceptionally good. The apparent cleanliness of the effluent is, indeed, quite remarkable. It will be observed that Messrs. Tatlock and Thomson, in the last analysis, made a favorable comparison in the matter of color with Loch Katrine water, the water that is supplied to the city of Glasgow, and that the matter in suspension is so small that it cannot be stated in figures. This analysis, I believe, represents what may be regarded as a uniform condition of the works. The sample of crude sewage represents the sewage at its best, because in taking these samples the solids were avoided, so that under this heading we have an analysis of what may be called the ordinary fluid part of the sewage. We have not been taking regular analyses of the filtrate, but I am of opinion the analysis here given represents pretty uniformly the character of the effluent. It appears to be better than it was either in 1899 or 1901, and if nothing more noxious than the effluent from the Barrhead purification works was discharged into the streams of this country our streams and rivers would be in a different condition to-day.

The works were constructed in accordance with the designs of the Septic Tank Syndicate, Limited. It was the first installation in Scotland, I believe, and it was indeed among their very earliest efforts. The works have been visited during the past six years by people interested in sewage disposal from all parts of the world.

The main point, however, of importance to the Burgh of Barrhead is that the sewage disposal has been carried out in what they believe to be a most satisfactory manner, with very little trouble and with very little expense, and I am convinced that if the system does not solve the question for the largest towns and cities, it certainly opens the way for a simple and effective means of sewage disposal in the great majority of cases.

ENGLISH MUNICIPAL ELECTRIC LIGHTING

Municipal Ownership of Electric Light Plants Profitable to Ratepayers in English Cities—1000 Such Plants in This Country Operated Advantageously

The operation of municipal electric lighting plants by local authorities in England has become the fixed and settled policy of the nation if we may judge by the figures which show that such plants are almost uniformly advantageous to the ratepayer and that the proportion of plants owned and conducted by local authorities, to those operated by companies is as 323 to 145. The capital already invested in the undertakings does not as yet show the same disproportion, being approximately: Local authorities, $150,000,000; companies, $130,00,000.

In the United States there are about one thousand municipally owned electric lighting plants, but many of them are in minor towns so that the capital invested would not total a very great sum. They are, however, increasing rapidly in number each year and are operated as advantageously to the taxpayer as are those in the English cities where, as will be seen by the subjoined table, which has been carefully compiled, but one city in the long list shows a loss in the operation of the lighting plant through the working expenses exceeding the total receipts.

In England the supply of electricity both by municipalities and companies, except in the case of undertakings authorized by Electric Power Acts, is regulated by the Electric Lighting Acts of 1882-88 and The Electric Lighting (Clauses) Act, 1899. The last mentioned Act consolidates all the important clauses which have been introduced into Provisional Orders. A Provisional Order confers on the owners the right to supply electricity in any given area. It is granted by the Board of Trade and is confirmed by an Act of Parliament, when it becomes an effective "Order." The possession of an Order has generally been regarded as the ownership of a monopoly of supply in the case of municipalities, and also as a matter of practice, of companies, except in London. In some cases Orders are amalgamated so that the total number of undertakings in course of construction or in operation, is less than the number of Orders. Orders are granted in perpetuity, but in the case of company orders, the local authority of the area of supply is given the right of acquiring the undertaking at the end of forty-two years, provision being made for the manner of such acquiring. The local authorities may buy out the companies by arrangement before the period of forty-two years and there are many instances in which local authorities have averaged for earlier terms of purchase than those specified in the Act.

Among the conditions imposed upon local authorities are that within two years of the granting of the Order they must "lay down suitable and sufficient distributing mains for the purpose of general supply throughout every street or part of street specified" in the Order. The Board of Trade has power to revoke the Orders. The system of supply must be sanctioned by the Board before the supply is started. The current may be charged for on several methods which must be approved by the Board. The maximum charge is usually thirty-six cents per Board of Trade unit—equal to 1000 watt hours.

It is provided by the Act that the local authorities shall, after paying working and establishment expenses, payment of interest, and providing instalments to sinking fund and any other expenses which cannot properly be charged to capital, provide "a reserve fund if they think fit, by setting aside such money as they think reasonable. Any deficiency of income in any year when not answered out of the reserve fund is charged upon and payable out of the local rate. The annual statement must be deposited with the Board of Trade and anyone is entitled to obtain a copy at a small charge.

In the case where the undertakers are not the local authorities, it is prescribed that they shall not associate themselves with any concern supplying energy unless the undertakers are authorized by Parliament to do so. Companies are also required to show the Board of Trade that they are in a position to efficiently carry out the order.

In the following table or record of municipal electricity work, which has been compiled from the official returns, the cents are omitted. The electric lighting year is from January to December, but the accounts in the majority of cases are made up for the municipal year, ending in England on the 25th or 31st of March, and in Scotland on the 31st of May. Undertakings that have not yet completed a full financial year are not included.

	Population.	Capital Outlay.	Total Receipts.	Working Expenses.	Net Receipts.
Aberdeen	157,000	$970,395	$147,555	$67,995	$79,560
Accrington	43,100	212,580	14,115	7,480	6,635
Ashton-under-Lyne	45,000	293,530	47,355	30,350	17,005
Ayr	28,600	417,550	51,885	28,255	23,630
Bangor	11,800	113,415	11,140	8,085	3,055
Barking Town	25,000	202,240	24,885	13,935	10,950
Barnes	20,000	176,340	11,425	5,910	5,515
Barnsley	42,000	272,270	32,555	16,235	16,320
Barrow-in-Furness	57,600	336,865	35,495	17,565	17,930
Bath	49,800	547,140	72,695	38,860	33,835
Battersea	180,000	892,225	46,250	31,550	14,700
Beckenham	28,200	341,190	29,460	16,420	13,040
Bedford	35,100	472,320	66,100	37,135	28,965
Belfast	349,000	1,108,590	112,520	45,775	66,745
Birkenhead	117,000	466,720	46,675	17,395	29,280
Birmingham	522,200	2,941,615	336,390	163,245	173,145
Blackpool	50,000	888,830	141,795	79,445	62,350
Blackburn	127,500	873,450	120,530	62,820	17,710
Bolton	171,100	1,037,410	168,460	64,425	104,035
Bootle	60,000	362,270	64,920	29,655	35,265
Bradford	281,800	2,148,840	330,960	142,115	188,845
Brighton	125,000	2,318,370	378,930	203,010	175,920
Bristol	328,800	2,266,450	256,865	121,040	135,825
Burnley	100,000	375,735	67,280	28,400	38,880
Bury	60,000	296,200	30,035	14,645	15,390
Burton-on-Trent	50,400	289,455	27,805	13,630	14,175
Bury St. Edmunds	16,700	124,265	10,970	6,665	4,305
Canterbury	24,900	261,240	29,945	14,680	15,265
Cardiff	164,300	787,805	103,455	50,305	53,150
Carlisle	45,500	257,750	30,900	22,380	8,520
Cheltenham	53,200	740,140	75,985	42,095	33,890
Chester	36,300	509,985	61,420	27,930	33,490
Chesterfield	29,000	168,670	18,510	5,880	12,630
Colchester	38,400	207,745	28,420	15,465	12,955

	Population.	Capital Outlay.	Total Receipts.	Working Expenses	Net Receipts.
Colne	23,000	130,715	4,335	3,925	410
Coventry	69,900	513,560	39,795	17,870	21,925
Crewe	45,000	217,935	24,965	9,305	15,660
Croydon	141,200	1,156,715	194,340	103,595	90,745
Darlington	45,000	199,510	20,270	8,990	11,280
Darwen	40,000	268,785	30,695	16,015	14,680
Derby	114,000	798,275	92,280	41,945	50,335
Devonport	69,700	440,745	47,465	32,990	14,475
Dewsbury	28,100	214,060	27,170	13,890	13,280
Dublin	289,100	1,295,375	75,325	45,540	29,785
Ealing	33,000	687,745	87,755	37,055	50,700
Eastbourne	43,300	741,115	88,155	35,420	52,795
East Ham	104,000	437,380	64,695	36,900	27,735
Eccles	34,400	114,310	12,955	9,990	2,965
Edinburgh	327,400	4,003,550	496,475	185,850	310,625
Epsom	10,900	116,045	8,150	6,420	1,730
Fareham	8,200	58,645	9,375	4,870	4,505
Farmouth	25,900	165,575	15,450	9,990	5,460
Fulham	143,000	846,465	49,585	44,210	5,375
Glasgow	800,000	5,208,730	622,225	242,900	379,325
Gloucester	48,000	$296,665	$23,450	$12,375	$11,075
Govan	90,000	261,345	29,850	18,275	11,575
Greenock	67,600	401,030	60,380	33,025	27,355
Grimsby	63,100	356,270	35,560	19,225	16,335
Hackney	230,000	1,135,330	102,325	34,660	67,665
Halifax	106,000	1,062,895	145,805	80,965	64,840
Hammersmith	114,200	951,645	128,255	73,690	54,565
Hampstead	81,900	1,602,145	234,135	120,480	113,655
Hanley	62,000	409,700	66,545	35,850	30,695
Harrogate	30,000	465,455	63,220	30,750	32,470
Hastings	65,500	644,720	79,945	41,655	38,290
Heckmondwike	9,500	83,195	5,370	3,160	2,210
Hereford	21,400	127,740	11,560	4,985	6,575
Hoosham	9,400	65,230	6,105	4,855	1,250
Hoylake & West Kirky	10,900	207,065	15,305	10,205	5,100
Huddersfield	95,000	822,985	109,575	38,800	70,775
Hull	240,600	1,262,730	161,105	82,065	79,040
Ilford	45,000	370,625	55,930	28,825	27,105
Islington	335,000	1,943,350	211,025	133,120	77,905
Keighley	42,000	237,980	9,580	8,740	840
King's Lynn	20,300	225,405	24,130	9,805	14,325
Kingston-on-Thames	37,000	416,420	40,295	23,240	17,055
Lancaster	40,300	275,980	33,880	18,295	15,585
Leeds	437,300	3,357,060	283,280	82,330	200,950
Leicester	211,600	1,081,160	121,880	43,205	78,675
Leigh	41,000	111,355	17,620	9,485	8,135
Leith	76,700	410,400	61,965	30,105	31,360
Leyton	120,000	632,275	71,540	32,560	38,980
Lincoln	49,000	227,565	26,875	12,000	14,875
Liverpool	705,000	5,683,545	946,010	446,285	499,725
Llandudno	9,300	191,770	25,240	15,665	9,575
Longton	39,100	104,965	5,600	2,080	3,520
Luton	36,400	140,515	7,885	5,230	2,655
Maidstone	35,000	226,210	23,150	15,790	7,360
Manchester	659,100	8,568,135	985,845	561,580	424,265
Middlesbrough	91,300	343,120	33,625	17,320	16,305
Middleton	25,000	165,355	22,675	12,995	9,680
Monmouth	5,400	85,345	4,905	3,220	1,675
Morecambe	11,800	310,025	22,890	14,300	8,590
Morley	23,600	126,560	8,615	7,845	770
Motherwell	33,000	255,175	20,505	7,745	12,760
Nelson	36,000	300,300	21,910	10,275	11,635
Newport	67,300	887,350	62,430	24,515	37,915
Nottingham	239,800	1,872,395	302,235	143,755	158,480
Nemeaton & Chilvers Coton	25,000	112,945	8,935	4,510	4,425
Oldham	137,200	1,084,410	130,860	67,800	63,060
Paisley	80,000	609,015	40,575	27,120	13,455
Partick	60,000	249,665	17,630	10,280	7,350
Perth	33,000	218,490	22,285	12,640	9,645
Peterborough	33,000	193,530	11,495	10,660	835
Plymouth	110,000	629,570	84,835	42,990	41,845
Patsmouth	192,200	1,092,230	168,750	97,740	71,010
Rathmines	20,000	371,305	28,610	15,540	13,070
Redditch	13,500	99,880	12,865	11,815	1,050
Rochdale	83,100	$249,345	$21,650	$16,430	$5,220
Rotherham	54,300	188,890	14,305	7,570	6,735
St. Annes-on-the-Sea	8,000	121,500	13,705	6,110	7,595
St. Helens	90,000	663,290	71,205	30,160	41,045
St. Pancras	235,300	2,117,500	328,230	164,575	163,655
Salford	221,000	2,454,805	226,120	92,490	133,630
Sheffield	412,000	3,084,970	236,000	78,770	157,230
Shipley	26,500	153,690	12,330	8,260	4,070
Shrewsbury	29,000	220,150	30,440	12,595	17,845
Southampton	107,800	691,295	117,570	57,880	59,690
Southend-on-Sea	28,900	227,730	26,210	21,730	4,480
Southport	48,100	864,160	99,800	37,985	61,815
Scuth Shields	103,000	729,075	78,320	27,820	50,500
Southwark	121,900	397,855	52,980	34,935	18,045
Stafford	20,900	149,440	15,395	7,950	7,445
Stepney	298,500	766,455	92,590	45,090	47,500
Stirling	18,400	182,580	14,570	7,390	7,180
Stockton-on-Tees	51,500	238,400	24,455	15,125	9,330
Sunderland	146,600	1,129,985	153,285	89,205	64,080
Sutton Coldfield	16,000	161,555	11,610	6,595	5,015
Swansea	94,500	492,870	40,570	17,675	22,895
Taunton	21,800	310,870	49,595	20,725	28,870
Torquay	20,000	224,730	28,405	17,060	11,345
Tunbridge Wells	33,400	357,330	60,065	32,005	28,060
Tynemouth	51,600	313,675	35,300	24,455	10,845
Wakefield	41,500	259,720	32,025	12,910	19,115
Wallasey	55,000	314,555	62,465	30,715	31,750
Walsall	86,400	282,705	32,490	21,615	10,875
Walthamstow	103,000	377,605	49,770	17,400	32,370
Warrington	64,200	308,960	37,775	23,600	14,175
Watford	30,000	226,695	30,350	23,960	6,390
West Bromwich	30,000	200,290	14,485	10,630	3,855
West Ham	267,300	925,845	125,285	77,920	47,365
West Hartlepool	62,600	361,395	29,705	18,130	11,575
Whitby	11,800	109,505	4,430	6,320 (loss)	1,890
Whitehaven	19,300	192,545	23,235	13,180	10,055
Wimbledon	41,600	501,010	72,980	37,540	35,440
Wolverhampton	94,200	665,785	104,520	46,035	58,485
Worcester	46,600	574,075	52,650	22,350	30,300
Wrexham	15,000	117,080	11,225	7,685	3,540
Yarmouth	51,300	312,280	54,665	31,745	22,020
York	80,000	347,140	34,725	21,650	13,075

MAYOR JONES' CITY

Some cities, like some men, possess positive personalities which immediately inspire admiration. That's precisely the sort of town Toledo, Ohio, is. Its atmosphere is surcharged with the electricity of enterprise and enthusiasm, and the visitor, viewing it for the first time, is apt to say instinctively: "This town is alive."

Toledo is imbued with the spirit of pride and patriotism. It lies midway between the metropolis of the East, and possesses both the conservatism of New York and the breezy optimism of Chicago. The golden-hearted Mayor Jones was wont to speak of Toledo with fatherly affection, and a city that commands such loyalty must possess special powers of attraction. Toledo is a smiling city of homes with scarcely a squalid street within its limits. It is a city of trees and parks, which are an inspiration and a delight. It is a city of easy distances—the next door neighbor of Detroit and Cleveland, and connected with both by water, steam and electricity.

Twenty-four railroads constitute it an ideal convention city. Toledo is on the main line of the greatest railroad systems of America. Three hundred passenger trains enter and leave the city every day. The city is passing through a development period as a municipality. Next year about $400,000 will be spent upon street and sewer improvements and the filtration plant, for which $600,000 has been appropriated, will be in course of construction. The influence of Samuel M. Jones has not passed with his passing. It makes Toledo an interesting study from a municipal viewpoint.

POPULATION, VALUATION, TAX-RATE AND INDEBTEDNESS OF THE CITIES OF MASSACHUSETTS, 1903

NAME OF CITY	POPULATION				VALUATION						TAX-RATE		INDEBTEDNESS									
	Enumerated in 1900	Relative Rank	*Estimated for 1903	Relative Rank	Real Estate	Relative Rank	Personal Estate	Relative Rank	Total	Relative Rank	Rate Per $1,000	Relative Rank	Gross Debt	Relative Rank	Sinking-Funds	Relative Rank	Net Debt	Relative Rank	Per Cent. of Net Debt to Valuation	Relative Rank	Net Debt Per Capita	Relative Rank
Beverly	13,884	31	15,302	29	$13,595,700	26	$4,697,675	20	$18,293,375	25	$16.50	20	$1,194,569	23	$488,213	14	$706,356	27	3.86	28	46.16	14
Boston	560,892	1	603,163	1	985,560,300	1	234,897,023	1	1,220,457,323	1	14.80	24	82,800,196	1	29,067,496	1	53,732,700	1	4.40	23	89.08	2
Brockton	40,063	12	44,873	12	25,928,710	13	5,298,468	17	31,227,178	13	21.80	1	2,427,400	10	465,000	15	1,962,400	11	6.28	10	43.73	17
Cambridge	91,886	5	98,639	5	87,063,400	3	17,708,510	5	104,771,910	3	16.90	16	8,932,203	3	2,202,891	3	6,729,312	2	6.42	9	68.22	3
Chelsea	34,072	15	35,876	17	21,774,500	15	2,324,564	28	24,099,064	18	18.60	7	1,619,500	18	507,086	13	1,112,414	21	4.62	22	31.01	25
Chicopee	19,167	26	21,031	26	7,345,060	33	2,315,230	29	9,660,290	32	18.00	9	632,300	32	3,149	28	629,151	31	6.51	7	29.92	26
Everett	24,336	21	28,620	20	19,133,500	20	1,842,650	31	20,976,150	22	17.00	15	996,330	26	174,194	23	822,136	26	3.92	27	28.73	28
Fall River	104,863	3	115,549	3	47,997,550	8	29,578,111	2	77,575,661	4	18.60	7	5,816,500	5	1,866,642	5	3,949,858	5	5.09	19	34.18	21
Fitchburg	31,531	18	35,069	18	19,482,245	18	4,962,595	19	24,444,840	17	19.20	6	1,709,498	16	441,695	16	1,267,803	19	5.19	16	36.15	20
Gloucester	26,121	20	26,121	22	15,698,930	24	5,188,955	18	20,887,885	23	15.80	23	1,578,020	20	128,575	25	1,449,445	17	6.94	5	55.49	6
Haverhill	37,175	18	42,104	13	21,120,285	16	5,468,007	16	26,588,292	16	17.60	11	1,878,822	15	513,750	12	1,365,072	18	5.13	18	32.42	23
Holyoke	45,712	11	49,286	11	30,019,360	12	10,436,380	9	40,455,740	12	16.40	21	2,900,500	9	737,119	8	2,163,381	9	5.35	14	43.89	15
Lawrence	62,559	7	69,766	7	33,314,050	11	9,567,997	12	42,882,047	11	16.40	21	2,139,100	13	401,446	18	1,737,654	12	4.05	25	24.91	30
Lowell	94,969	4	101,959	4	56,822,710	5	15,173,143	7	71,995,853	6	20.40	3	3,657,775	8	685,438	9	2,972,337	8	4.13	24	29.15	27
Lynn	68,513	6	72,497	6	44,182,625	9	10,167,000	10	54,349,625	10	18.00	9	5,063,450	6	1,466,069	6	3,597,381	6	6.62	6	49.62	8
Malden	33,664	16	36,286	16	24,571,700	14	4,676,020	21	29,247,720	14	16.60	19	1,932,529	14	343,955	19	1,588,574	15	5.43	12	43.78	16
Marlborough	13,609	32	13,609	32	7,917,776	31	1,433,455	32	9,351,231	33	19.60	5	975,956	27	327,125	20	648,831	29	6.94	5	47.68	11
Medford	18,244	28	20,962	27	17,987,750	21	2,858,250	25	20,846,000	24	19.80	4	1,582,659	19	530,128	11	1,052,531	22	5.05	20	50.21	7
Melrose	12,962	33	13,600	33	13,780,625	25	1,397,005	33	15,177,630	27	18.00	9	1,041,014	25	155,263	24	885,751	24	5.84	11	65.13	4
New Bedford	62,442	8	67,198	10	38,165,450	10	24,402,079	4	62,567,529	8	18.00	9	4,273,814	7	1,044,398	7	3,229,416	7	5.16	17	48.06	10
Newburyport	14,478	29	14,478	30	7,415,300	32	3,264,929	24	10,680,229	31	16.20	22	794,500	30	108,087	26	686,413	28	6.43	8	47.41	13
Newton	33,587	17	37,794	14	48,066,750	7	15,059,825	8	63,126,575	7	16.80	17	6,726,201	4	2,017,979	4	4,708,222	4	7.46	3	124.58	1
North Adams	24,200	22	27,862	21	11,733,485	28	2,747,463	26	14,480,948	28	20.50	2	1,122,566	24	—	—	1,122,566	20	7.75	1	40.29	19
Northampton	18,643	27	19,883	28	10,086,210	29	2,521,301	27	12,607,511	29	16.70	18	659,500	31	26,000	27	633,500	30	5.02	21	31.86	24
Pittsfield	21,766	25	22,589	25	13,360,042	27	3,881,605	22	17,241,647	26	17.80	10	925,734	28	—	—	925,734	23	5.37	13	40.98	18
Quincy	23,899	23	26,042	23	19,703,350	17	3,370,965	23	23,074,315	19	17.30	12	1,626,190	17	—	—	1,626,190	14	7.05	4	62.44	5
Salem	35,956	14	36,876	15	19,400,200	19	9,605,769	11	29,005,969	15	17.80	10	882,767	29	296,172	21	586,595	32	2.02	32	15.91	33
Somerville	61,643	10	68,110	9	51,296,100	6	5,685,260	15	56,981,360	9	17.20	13	1,477,000	21	—	—	1,477,000	16	2.59	29	21.69	31
Springfield	62,059	9	69,389	8	60,787,130	4	16,420,768	6	77,207,898	5	14.60	25	2,237,700	11	268,000	22	1,969,700	10	2.55	30	28.39	29
Taunton	31,036	19	33,656	19	15,778,365	23	5,830,810	13	21,609,175	21	20.40	3	2,189,257	12	545,061	10	1,644,196	13	7.61	2	48.85	9
Waltham	23,481	24	25,198	24	15,967,700	22	5,712,548	14	21,680,248	20	17.10	14	1,271,000	22	418,197	17	852,803	25	3.93	26	33.84	22
Woburn	14,254	30	14,300	31	8,896,726	30	2,066,658	30	10,963,384	30	18.50	8	260,340	33	—	—	260,340	33	2.37	31	18.21	32
Worcester	118,421	2	132,044	2	92,358,300	2	25,583,281	3	117,941,581	2	17.60	11	11,055,060	2	4,774,659	2	6,280,401	3	5.33	15	47.56	12
Totals (Cities)	1,880,087	—	2,039,731	—	$1,906,311,884	—	$496,144,299	—	$2,402,456,183	—	16.21	—	$164,379,950	—	$50,003,787	—	$114,376,163	—	4.76	—	56.07	—
Totals (Cities and Towns)	2,805,346	—	3,023,704	—	2,505,720,342	—	694,381,140	—	3,200,101,482	—	15.99	—	188,037,007	—	52,131,594	—	135,906,382	—	4.25	—	44.95	—
Percentage of Cities to Totals	67%	—	67%	—	76%	—	71%	—	75%	—	—	—	87%	—	96%	—	84%	—	—	—	—	—

*Estimated by the State Board of Health on the rate of growth from 1895 to 1900. The populations of Gloucester, Marlborough and Newburyport were allowed to stand as enumerated in 1900, they having suffered a slight decrease during the five-year period.

MUNICIPAL JOURNAL AND ENGINEER

Published Monthly by
THE MUNICIPAL JOURNAL PUBLISHING COMPANY
253 Broadway, New York

WILLIAM S. CRANDALL, - - - - - - - - Managing Editor
EMIL KUICHLING, C. E., - - - - - - - Engineering Editor

JOHN B. BENNETT, - - - - - - - - - Business Manager
JAMES H. VAN BUREN, New York, - - - Eastern Representative
J. M. SCHLOENBACH, Chicago, - - - - Western Representative

TERMS OF SUBSCRIPTION
(Payable in Advance)

United States and Canada	$3.00 per year
Foreign Countries	3.00 "
Single Copies, each	.25

Special rates given for clubs of ten or more.

Make all checks payable to The Municipal Journal Publishing Company

Entered at the New York Post Office as second-class matter

NEW YORK, DECEMBER, 1904

Commercial Value in Public Improvements

There are many municipalities which do not appreciate that all public improvements have a commercial value. For instance, there is little doubt in the minds of well-informed and observing citizens that the bad pavements of Chicago have militated against its material prosperity. While it is, in itself, a most remarkable example of civic growth there is no doubt that it would to-day be a much greater city if it had given more attention to its thoroughfares ten or twenty years ago. Unlike New York and Philadelphia, it has neglected this important matter to a degree that has made its streets the laughing stock of the world. Happily for its future, this defect is soon to be remedied, as the report of the expert engineer, Mr. John W. Alvord, given in a recent number of the Municipal Journal and Engineer, bears testimony.

The first requisite for a prosperous commercial center, whether of great or small dimensions, is well-paved streets kept in a thorough state of repair and well cleaned. No city is well paved which has not endeavored to select the form of pavement best suited to particular streets, the character of the pavement being determined by the kind and quantity of its traffic. For instance, it would be worse than folly to pave a street like Broadway, in New York City, with macadam. On the other hand the granite or Belgian block is not best suited to the heavy traffic of that street. The unevenness with which these materials wear, even though they are among the most durable, is sufficient evidence to prove their unsuitableness for such a street, while their slipperiness makes them still more objectionable. The smooth pavements, such as the bitulithic, asphalt, treated wood block and brick are coming more and more into favor. As a matter of fact they are the only forms of pavement that should be used on any street. The multiplied use of the motor car, motor truck and the gradual disappearance of the horse from certain sections of every large city, will have much to do with forcing the rough pavements to the rear.

Next after the streets come the methods of transportation, the development of public utilities, whether owned by the city or private corporation. The quality of the service of these various quasi-public corporations will determine, in large measure, the degree of prosperity which may be expected. If, for example, the administration of the water department is weak and unsatisfactory, the commercial interests of the municipality will surely feel the ill-effects. In a less degree the same will be true if any other similar public utility is not maintained at its best.

After these come the development of the parks, playgrounds, convenince stations, public baths, public libraries, and similar institutions designed to contribute to the welfare and happiness of all the people, particularly those who haven't sufficient means with which to provide themselves with what may, very properly, be considered as public necessities.

Last, but by no means the least, is the increased valuation which comes from beautifying a city. "The city beautiful" is more a dream of the present than of the future, and civic art has a value that is far from imaginary.

Leamington, in Warwickshire, affords an interesting instance of what the mere beautifying of a place can do to make a city prosperous. Originally it was a popular interior watering place but fashion changed and the patronage went elsewhere, property values declined, and a spirit of dejection took possession of the people. It afforded no special advantages for manufacturing or commerce, and so they fell back on making it a desirable place of residence. They organized an improvement association, pledged the credit of the city for the purchasing of parks, secured the margin of the Leam River, beautified the banks, laid out walks and drives, and even subsidized a brass band and a boat service on the river. With the transformation of Leamington, from an artistic point of view, came the transformation in property values, and in the prosperity of the entire community. All the old houses were filled with families who came there because it was a nice place in which to live; and within five years over seven hundred new homes were created, and the city has since been prosperous and the people contented.

Necessity for Underground Wires

Regarding the growing necessity for placing all wires underground, the Rochester *Democrat and Chronicle* points out that the great storm which recently swept over the East has directed attention anew to this important question. The paper says:

"One of the chief obstacles to the removal of overhead wires has heretofore been the necessarily great expenditure. So long as the removal of the wires from the streets was a matter which affected, primarily, only the public and its interests, telegraph and telephone companies naturally evaded this large expenditure, excepting when forced to comply with municipal demands. Up to within a short time, the question of burying cross-country wires has not attracted

much attention. Sunday's storm, however, disabled so many through telegraph and telephone lines that this phase of the underground wire question obtrudes itself very prominently. The enormous damage sustained by the business world, to say nothing of the inconvenience and vexation, leads to the suggestion that even through wires may be placed underground with ultimate profit. Corporations maintaining telegraphic and telephonic service are not usually short-sighted. They do not hesitate at the expenditure of any amounts which will, through a series of years, throw the balance of percentage of profit on the right side of the balance sheet. It is not unlikely, therefore, that the subject of placing all wires, or nearly all, in subways will be taken up seriously."

Companies owning and operating wires have learned that they are subject to damage during great storms. This fact ought to hasten the day when they will put their wires underground where they belong.

An Admirable Precedent

IN the annual report of the Board of Public Works of Davenport, Iowa, to the Mayor of that city, there occurs the following remarkable and presumably unique paragraph:

"No member of the Board of Public Works has been directly or indirectly interested in any contract let by said Board, and no member has been interested in the sale and purchase of any materials used in the construction of any work or improvement, and no member has received any present or compensation whatsoever, from any contractor or person interested in any work or improvement."

This is concise, clear, unequivocal. The report is sworn to, which adds to the value of the statement quoted. It might be said that honest men have no need to asseverate their honesty. While this may be true in private life, a public officer cannot be too explicit in accounting for his stewardship. Such a statement as the one above should be incorporated in the report of all similar bodies in all cities.

It is an admirable precedent.

Protest Against Subway Signs

IT is an encouraging sign of the times to note that the press of New York City, without exception, has raised its voice in honorable protest against the unsanitary and artistically degrading disfigurement of the new Subway through the nailing of glaring and vulgar advertisements upon the walls of beautiful mosaic. Mr. August Belmont, representing the lessees of the tunnel, has been warned that what the people have given, the people can take away. It has also been pointed out to him that it may also be poor finance to ignore the expressed wish of four million citizens for temporary financial gain. The State gives charters and it has the power to rescind them. The fact that it is not often done does not imply that it cannot be done in this case.

Arrayed on the side of municipal pride, sanitation and beauty are the Municipal Art Society, the Rapid Transit Commission, which represents the city, and the city itself. On the other side is the Interborough Rapid Transit Company, who, for gain, desire to disfigure the Subway stations by displaying advertising signs promiscuously. The Municipal Art Society has awakened public interest in the matter to an extent not hitherto deemed possible. The Rapid Transit Commission has expressed the desire that the signs be removed from the stations. At the present writing the request of the Commission has been ignored, and it looks as though there might be an appeal to the courts to settle the matter, in which case posterity can enjoy the fruits of the decision, should it be against the obnoxious signs. Meantime the really artistic stations are marred by the glaring vulgarity of the disfiguring advertisements.

There remains, however, one simple and expeditious way to cut the Gordian knot. The advertisements are, beyond doubt, unsanitary. The Board of Health has the power to declare them a nuisance and have them summarily removed. When New York gets a Board of Health that would dare take such a step for the public good, she will have made a long step in the direction of civic progress.

Editoral Comment

THE city of Cleveland, Ohio, has a local regulation which declares all signboards and billboards now and hereafter erected on any residence street within two hundred feet of any park, park boulevard, or driveway (except on one-sheet boards for advertising premises that are for sale) to be nuisances, and that the inspector of buildings is given power to abate them.

This is an admirable example for other cities to follow. They could not do better, also, than to adopt the clever device of Cleveland citizens in overcoming some of the objectionable features of billboards that are not reached by the code, by planting quickly growing shrubs and bushes in front of such billboards. It is highly creditable to Cleveland to thus point the way to abating a gross nuisance.

A report made to Mayor Neff, of Kansas City, recently by an expert accountant, showed that the city was losing $125,000 a year through its defective system of bookkeeping. The Mayor is convinced that there is a necessity for the reforms outlined in the report. In a general way it is proposed to follow out the principles recommended by the National Municipal League.

This is as it should be, and in bringing about a reform of the character outlined, a method of central control is necessary to a well devised system of accounting, and essential to efficient administration.

IT is a pleasure to call attention to the work of the International Society of State and Municipal Building Commissioners and Inspectors. This association was organized but a year ago, and is pushing its work with zeal and far more earnestness than is common. Among other things, it proposes to assist cities, towns and villages in preparing or revising building laws looking to the betterment of building conditions in our municipalities, and will even give advice free to individual builders or owners in order to lessen the danger of fires in our communities. As the Secretary, Mr.

F. W. Fitzpatrick, 1431 Welling Place, Washington, D. C., is a consulting architect, the service rendered by this society will be the more helpful.

THE leading provision of the Baltimore anti-smoke ordinance is as follows:

"Be it ordained by the Mayor and City Council of Baltimore, that every furnace hereafter constructed, to be employed in the working of engines by steam, or in any mill, factory, printing house, dye factory, iron foundry, glass house, distillery, brew house, sugar refinery, bake house, gas works, hotel or office building, apartment house, or in any other building used for the purposes of trade or manufacture, shall be so constructed as to consume or burn the smoke arising therefrom, and so as not to emit dense or black smoke."

This is by no means radical, and it is to be hoped that Baltimore will have the satisfactory results obtained in other cities where vigorous action has been taken to stop the nuisance.

UNDER a new ordinance providing for the licensing of dealers in milk and inspection of cows and dairies in Duluth, Minn., the health authorities are given power to inspect all cows and dairies whose owners offer milk for sale, to apply the tuberculine test for tuberculosis, to tag each animal that has stood the test, and to issue licenses to dealers who have complied with all the requirements, and to revoke licenses already issued or refuse to issue licenses to such dealers as have not met these conditions. The ordinance also provides for milk inspection and to revoke the licenses of those who add any harmful ingredient or attempt to sell milk from which the cream has been separated without proper designation, or milk that is below the standard in solids or butter fat. The ordinance applies to every individual who exposes milk for sale, and to every cow whose milk is sold and every stable containing such cows.

Apropos of this ordinance the Duluth *Herald* aptly remarks that the next legislature should make it a crime, punishable by imprisonment, for any person to adulterate milk or any other food or drink with any article that is poisonous or injurious to health. With this sentiment all humane people will certainly agree.

Personalities

—Mr. Leon Dalton has been re-elected city engineer of Dallas, Texas.

—Mr. E. G. Helm has recently resigned as city engineer of East St. Louis, Mo.

—Mayor Gustavus A. Robertson, of Agusta, Me., died at his home in that city November 11.

—Ex-Mayor C. F. Birk, of Bucyrus, O., was married October 10, to Mrs. Gerisch, of that city.

—Mr. John W. Phippen has been appointed superintendent of the water works of Watertown, N. Y.

—Frank P. Foster has been re-elected Secretary of the International Association of Municipal Electricians.

—Mayor Paul Capdevielle, of New Orleans, was appointed Auditor of the State of Louisiana on November 11.

—Thomas Osborne was re-elected Mayor of Auburn, N. Y., on November 8, by 207 plurality. Mr. Osborne is a Democrat.

—Mayor Frank S. Katzenbach, of Trenton, N. J., was married on November 10, to Mrs. Natalie McNeal Grubb, of Wyncote, Pa.

—Mayor Smith, of Binghamton, N. Y., extended the freedom of the city to the visiting police chiefs who attended the recent convention in his city.

—Mr. C. A. Elder has been appointed superintendent of the Amherst Water Company, of Amherst, Mass., to succeed Mr. W. W. Hunt, who recently resigned.

—Mr. W. A. Clement, the engineer in charge of the municipal sewer department of Toronto, Can., was married to Miss Louise Thompson-Currie, in that city on October 26.

—Water works Superintendent Bemis, of Cleveland, O., is pleased over the fact that meters are becoming very popular in his city to the mutual advantage of citizens and city.

—J. G. Armson, Democrat, was re-elected mayor of Stillwater, Minn., over Edwin St. John by 320 majority. There was no opposition to E. S. Foster, Republican, for city treasurer.

—M. N. Baker, C. E., president of New Jersey Sanitary Association, will deliver the president's address on *Municipal Sanitation in Great Britain*, on the evening of December 9, at the annual meeting of the Association at Laurel House, Lakewood, N. J.

—Former Mayor P. M. McCue, of Charlottesville, Va., was on November 5, found guilty of the murder of his wife, after an extended trial marked by most dramatic incidents. On November 9, Mr. McCue was sentenced by the court to be hanged on January 20, 1905.

—Sir James Powers, Mayor of the city of Waterford, Ireland, has been visiting the great centers of industry in this country. He was delighted with his visit, saying that the one thing that struck him more than anything else is the hospitality and kindliness of the American people.

—For the second time B. F. Ault, councilman from the Third Ward, in Geneva, Ind., has resigned from that office. Four years ago, following the Republican victory at the polls, Ault resigned. Ault is a Democrat, and he says he will not hold office during a Republican administration.

—A terrible explosion occured in the rear of the residence of Mayor Fay, of Virginia, Minn., on November 13, wrecking the handsome building. No one was injured. The mayor has been waging a vigorous warfare upon the violators of the saloon law and threats had been made against him.

—The recount of the vote cast for mayor of Orange was completed November 22. The result showed the election of Major Isaac Shoenthal, Democrat, over John A. Ackerman, Republican, by sixty-five votes. The figures returned by the election boards showed Shoenthal's election by ninety-nine majority.

—The mayors of three cities recently officiated as ringmasters at a society circus that was held in the Auditorium, at Malden, Mass. The mayors were: Sidney H. Buttrick, of Melrose; Thomas J. Boynton, of Everett, and Charles L.

Dean, of Malden. Other characters were taken by prominent residents of Malden.

—Mr. Edward A. Bond, of Albany, chairman of the Canal Commission, formerly State Engineer and Surveyor, was married in Clayton, N. Y., on November 10, to Miss Clara Estelle Ellis, daughter of the late Dr. Amos Ellis. Mrs. Bond was one of the most prominent society women of Clayton, and has a host of friends in that village.

—The officers of the Municipal League of Indiana for the coming year are as follows: President, George E. Downey, ex-mayor, Aurora; first vice-president, Edward J. Fogarty, mayor, South Bend; second vice-president, H. C. Steeg, ex-mayor, Terre Haute; secretary, George F. Harper, city clerk, Madison; treasurer, L. W. Mellett, ex-city attorney, Elwood.

—Harry C. Bickle, mayor of Chardon, O., was quietly married to Miss Carolyn M. Conley, of that place, November 9. Mr. Bickle is twenty-eight years of age and one of the youngest mayors in Ohio. He is a musician of ability and was formerly leader of the Chardon band. Miss Conley is one of the best known school teachers in Geauga county, having taught in the Chardon high school for fifteen years.

—Mayor Nowrey, of Camden, N. J., on November 16, filed a petition with Supreme Court Justice Garrison for a recount of the votes for mayor in all wards of the city. Judge Garrison took the petition and assured the mayor's counsel, Lawyer French, that when the necessary bond was filed he would sign an order. The petition of the mayor set forth that there had been a mistake made in counting of the votes so that the result had been changed.

—The judgment of the Warren Circuit Court in the case of E. L. Mottley against George T. Wilson, involving the mayorality of the city of Bowling Green, was affirmed by the Court of Appeals on November 18. Judge Hobson delivered the opinion of the court. The election was held on November 3, 1903, Mottley, the Republican candidate, receiving 855 votes, and Wilson, the Democratic candidate, receiving 880 votes on the face of the returns. Mottley contested, and the lower court dismissed his petition.

—"Charles Mulford Robinson, of Rochester, N. Y., who has been employed to make a written report on the best method of beautifying Detroit, Mich., is a graduate of the University of Rochester. He has been an editor but has spent much time in foreign travel and the study of civic aesthetics. He has been secretary of the American Park and Outdoor Art Association since 1902, is a member of the National Committee on Municipal Improvements of the Architectural League of America and is an author of several works on municipal affairs," says a Detroit newspaper.

—Among the mayors of cities elected or re-elected during the recent fall elections were B. W. Griffith, Memphis, Miss.; Henry E. Lee, Saginaw, Mich.; Eugene E. Reed (Dem.), Manchester, N. H.; Alphonse Gaulin, Jr. (Rep.), Woonsocket, R. I.; Daniel P. Quinn (Dem.), Watervleit, N. Y.; P. J. Boyle (Dem.), Newport, R. I.; William Cardwell (Rep.), East Orange, N. J.; Samuel J. Berry (Rep.), Elizabeth, N. J.; James F. Buckle (Rep.), Plainfield, N. J.; George W. Brooker, Fulton, N. Y.; L. B. Norton, Lithonia, Ga.; Henry M. Doremus (Rep.), Newark, N. J.; H. S. Cummings (Dem.), Stamford, Conn.

—Mayor M. A. Brouse, of Kokomo, Indiana, who recently attended the meeting of the Indiana Municipal League, has expressed the opinion that the newspaper accounts of the action of the league on the Metropolitan Police law are misleading. Mayor Brouse said: "It is probable that a bill will be submitted in the next legislature providing for the election of a single commissioner by popular vote who will have control of both the police and the fire departments of cities not operating under special charter, with power to appoint and remove police officers and members of the fire department under much the same restrictions as now apply to the police commissioners appointed by the Governor. It is said that such a measure will have the support of many members of the Municipal League."

Convention Dates

December.

—American Society of Mechanical Engineers will hold their annual meeting at New York City, December 6-9. Secretary, F. R. Hutton, 12 West Thirty-first street, New York City.

—New Jersey Sanitary Association will hold their thirtieth annual meeting at Laurel House, Lakewood, N. J., December 9 and 10. J. A. Exton, M. D., secretary, Arlington, N. J.

January, 1905.

—The American Public Health Association will meet at Havana, Cuba, January 2-6, 1905. Dr. Charles A. Probst, secretary, Columbus, O.

February, 1905.

—National Brickmakers' Association will meet for its nineteenth annual convention at Birmingham, Ala., January 30 to February 11, 1905. F. S. Randall, secretary, Indianapolis, Ind.

March, 1905.

—The International Society of States and Municipal Building Commissioners and Inspectors will meet at Washington, D. C., March 2-4, 1905. F. W. Fitzpatrick, secretary, 1431 Welling Place, Washington, D. C.

October, 1905.

—American Society of Municipal Improvements will meet at Montreal, Can., some time during 1905. George W. Tillson, C. E., secretary, Municipal Building, Brooklyn.

—The League of American Municipalities will meet at Toledo, O., in 1905. Hon. John MacVicar, secretary, Des Moines, Ia.

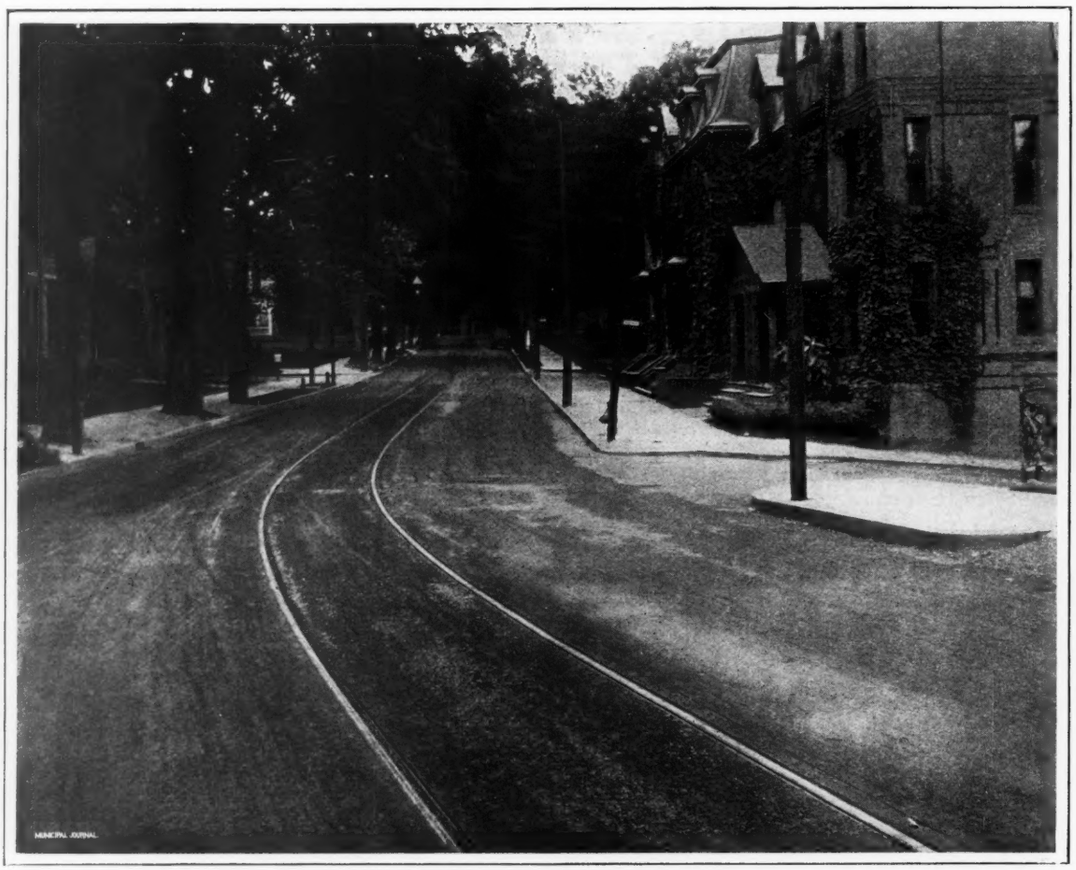
THE first step in an effort to compel steam railroads entering the city of Cleveland, Ohio, to properly guard grade crossings was taken by the City Council recently. Resolutions were adopted requiring the various roads to erect gates at sixty-eight crossings.

The demand on the railroads, while sweeping, is obviously justifiable under the circumstances. The roads must protect life.

Bitulithic Pavement in Springfield

ACCORDING to press accounts the citizens of Springfield, Mass., appear to be deeply impressed and pleased with the new bitulithic pavement recently laid in that city. While the work was in progress it was watched closely by many people, because the well-known reputation of this pavement had preceded its adoption by the city, and people were curious to observe the manner of its construction. The result of this work is graphically portrayed by the accompanying illustrations, showing the finished pavement on one of the most beautiful streets in Springfield, and another on one of the business thoroughfares.

Superintendent of Streets, Arthur A. Adams, expressed his high appreciation of the methods of construction, and of the fine appearance of the pavement when finished. Mr. Adams expressed the strong opinion that no better pavement had ever been laid in the city, while the property owners along the improved streets have been as strong in their expression of satisfaction.



MAPLE STREET—THE WEALTHIEST IN SPRINGFIELD, MASS.—PAVED WITH BITULITHIC

The Springfield *Union*, the leading daily paper of the city, said in a recent issue: "One of the best features, from the standpoint of the public, is that the material is ready for traffic almost as soon as it is down, as the section completed in the morning was opened to traffic the same evening." Continuing, *The Union* described the process of construction as follows:

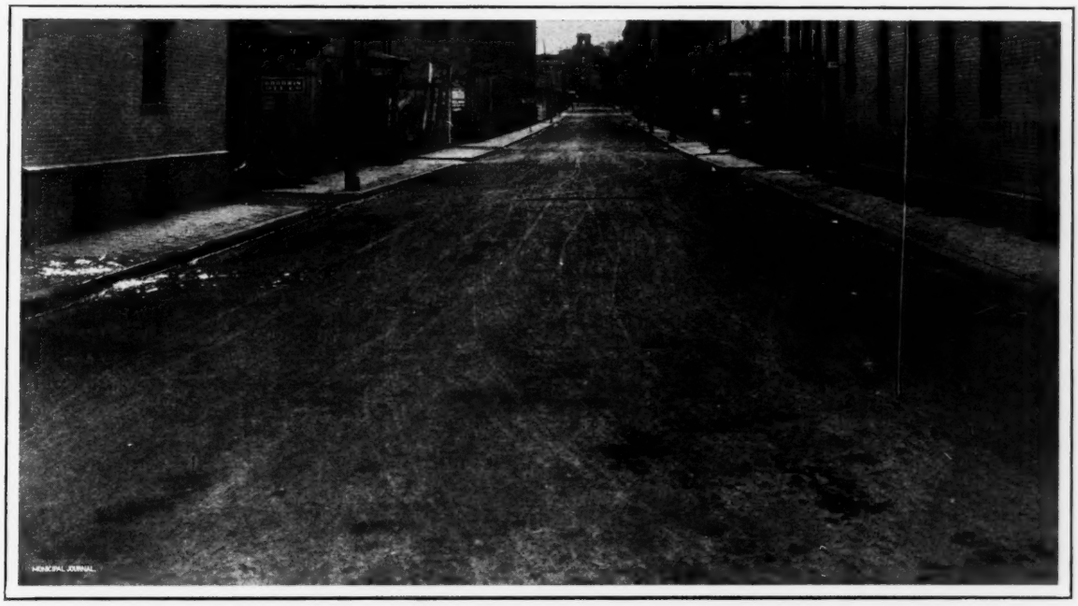
"The bitulithic pavement is monolithic and of the greatest density; the voids being reduced to a minimum, the mineral mass being equal almost to solid stone. This result is obtained in a simple, but at the same time, scientific manner. The bitulithic pavement is constructed with from four to six inches of two and one-half to three-inch crushed, hard stone foundation, laid on a thoroughly compacted sub-grade. This foundation is compacted by a 15-ton road-roller, and is brought to a true surface. Hot bituminous cement is then poured over the surface so that it will run into the interstices, thus binding it together and making it waterproof. On top of this foundation is laid the wearing surface or pavement proper. The broken stone used in the foundation is heated in revolving drums to about 200 degrees Fahrenheit, and then, by carefully arranged screens, separated into seven different sizes and deposited in separate bins. From these bins is drawn the exact amount of each size required. This aggregate is then placed in a turning, machanical mixer, and the heated bituminous cement, by exact weight, is poured in and the mixing continued until every piece of stone, from the largest to the finest powder, is covered with a thin coating of the waterproof cement. It is then dumped into wagons and hauled to and deposited in a layer or sheet on the foundation prepared as above described, and then rolled with a 15-ton roller.

"The result is practically a solid. It is rigid because the large, angular stones in the mass are wedged together. These large stones thus wedged would bear the weight of any load likely to be hauled over them, without the use of any cementing material. It is, therefore, not necessary, as it is in the construction of an asphaltic pavement, which is sand mixed with bituminous cement, to have the cement so

stiff or hard that under all atmospheric conditions, the cement is strong enough to support the grains in a column. The sand, without the cement, no matter how arranged, will not bear any load.

"The smaller materials fill the voids in the larger, thus giving density; practically the density is a solid. In the bitulithic pavement the bituminous cement makes it absolutely waterproof, and holds the fine material in the interstices, preventing it from shifting or going to the bottom as in macadam, and prevents the pavement from rolling into waves, a common fault of the asphalt pavement. The cement likewise forms a cushion between the stones and prevents them from rubbing against one another, thus making the pavement elastic and quiet.

"Before receiving the finishing touches the bitulithic pavement surface is slightly honeycombed by the laying of the stones. A flush coat of quick-drying cement is therefore poured on or squeezed into these indentations; a sprinkling of heated fine stone chips is then spread over the surface and rolled in with the heavy roller. By this means, while the pavement has a surface for wheels equal to asphalt, it provides a foothold for horses equal to macadam."



ONE OF THE BUSINESS STREETS OF SPRINGFIELD, MASS., PAVED WITH BITULITHIC

The Lesson of the Melrose Disaster

READERS of the MUNICIPAL JOURNAL will recall the frightful accident caused by a trolley car coming in contact with a box of dynamite at Melrose, Mass. Concerning the causes which made this accident possible, Prof. E. P. Harris, of Amherst College, sent to the local paper a thoughtful communication, of which the following is an excerpt:

"Accidents are so common now that we should almost be disappointed if our morning paper did not have headlines pointing to some disaster. Most commonly we charge human greed and blunder over the account of Providence. Upon this special dynamite disaster at Melrose I have something to say from my own line of work and knowledge. The use of high explosives has increased enormously in the past few years. Also the demand for higher power explosives is now made every day. A grade of explosive used two years ago does not fill the bill at all except for some side jobs. A recent blast threw out more than 1,000 tons of rock in pieces to be handled. Dynamite, or rather nitroglycerine in some of its forms, is the common explosive of this country, and the disaster of yesterday is but one of the very many that have occurred and are almost weekly occurring.

"It has great power, but it cannot be made safe. The question the public may ask is, do we have any safe and yet powerful explosive? An absolutely safe explosive for every careless blunderer is not known. It would be rather contradictory to the name and character of an explosive. But relatively safe explosives are known and can be used. Dynamite will explode easily by concussion. A majority of all accidents are from that cause. Dynamite is most dangerous when frozen. The number of accidents from that source is great, and next to the cause above given. Dynamite "leaks," and it "leaks" in proportion to the per cent. of nitro-glycerine it contains. The leaky dynamite is dangerous to handle. And at present the demand for highest grade explosives compel the oversaturating of the "dope" with the dangerous oil. Now more than nineteen-twentieths of all accidents come from the above-mentioned causes.

"There are explosives that will not explode by any concussion whatever. There are explosives that will not freeze and can be as safely used in Arctic regions as at the equator. There are explosives that do not "leak" and contain no liquid or oil to leak. But have such explosives the power of dynamite? I simply state that they have. And that which has made dynamite so much more dangerous recently is raising the per cent. of nitro-glycerine to more than meet

the power of other explosives. But what of their cost as compared with nitro-glycerine explosives? For all higher grades the cost is the same, and for the lower grades, where not much power is required, there is but a very slight difference. Then, you may ask, why is so dangerous an agent used when a comparatively safe one is at hand? That is just the point, and it is the kernel of this letter. It is the "trust" and the millions back of it. The public must contribute its sacrifices of lives and its untold destruction to sustain one of the modern grand institutions of our country, an all-controlling "trust." My object in this is not to alarm the public, because we all glory in our great trust institutions, and we seem quite as much pleased to make our sacrifices of life and property as the loyal and patriotic Japanese to give their brave sons to the demon of war, but I simply would defend Providence from bearing all the burden."

Purifying the Water Supply

The problem of securing a pure public water supply is beginning to excite popular interest. This is shown by the treatment the subject is given in the popular monthlies. In the December *Century Magazine* Gilbert H. Grosvenor gives an interesting account of what he calls "The New Method of Purifying Water." For the benefit of the readers of the Municipal Journal and Engineer, the following excerpt, how one town worked a seeming miracle in the cleansing of its reservoir, is made:

"Just at this time there came to Dr. Moore's special notice the troubles of a small town in Kentucky. At much expense, several years before, the town had built an elaborate water supply system, but it had continual difficulty with the water. On examining the reservoir, Dr. Moore found the water packed with anabaena organisms, as many as 7,000 filaments to the cubic centimeter. A colony of anabaena when enlarged several hundred times look like a bracelet of small green stones with larger yellow stones set in at intervals. The water smelled like a pigpen, and tasted to match, and was of a slimy, greenish color. The reservoir was not a large one, being of about 25,000,000 gallons capacity—just what was wanted for the first test. As the algae were so dense, he decided to give the rather strong dose of 1 to 4,000,000. The experiment was made in July, 1903.

"The only apparatus required was some coarse sacks and a rowboat. About 200 pounds of the blue vitriol were placed in the sacks and hung from the stern of the boat. Then the boat was rowed up and down, backward and forward across the reservoir for several hours, covering every part of the surface in order that the copper should be evenly distributed. The crystals were soon dissolved, and the party returned to the shore. Dr. Moore knew that the small amount of copper used was so thoroughly distributed that it could not make the water dangerous to drink; but would it be strong enough to destroy the foul-smelling plants in the water? At first the smell grew worse, but he was not particularly alarmed, as he had expected that the commotion made in the water would break up many of the tiny oil sacs and liberate the oil. At the end of twenty-four hours the greenish color began to disappear; at the end of forty-eight hours the green was entirely gone and the surface was clear, but the water had a light-brown tinge, due to the dead organisms held in suspension At the end of the third day the water was clear, sweet and completely cured of the disagreeable smell and taste. Tests showed that there was not an anabaena left. To make sure that the copper had not poisoned the water, Dr. Moore tested it a few hours after the dose was applied and found no trace of the copper remaining.

"It cost $12.50 to purify the reservoir, the only item of expense being the blue vitriol, which costs about 6 or 7 cents a pound. The town, which had been spending thousands of dollars each year ineffectually, has had no further trouble.

"After this successful experiment Dr. Moore attacked larger reservoirs, with equal success. In the fall of 1903 he sterilized a basin of 600,000,000 gallons in Massachusetts, formerly a part of the water supply system of Boston. At that time the water contained 10,000 organisms to the cubic centimeter. After the treatment he could not discover a single organism. This year only from 30 to 60 to the centimeter were found, and a very slight dose has killed these. The largest reservoirs in the world can be treated in the same way. When a very large surface has to be covered, it is better to use several boats, or perhaps a small launch, in order that every part of the reservoir may be evenly treated. The treatment costs from 50 to 60 cents per million gallons. July is the best month to kill algæ. The organisms are then, so to speak, most relaxed, as they have not yet formed their spores and hardened themselves for the winter. All algae are not equally sensitive to the solution, so that the strength of the dose varies with the different species."

A "Hospital Town"

When the new hospital in Vienna, of which the foundation stone was recently laid by the Emperor of Austria, is completed it will form quite a town in itself.

The total area covered is 2,400,000 square feet, and there will be forty separate buildings, of which thirty-two will be clinics or hospitals and the remaining eight will be devoted to offices and residences for the staff. All the clinics will have flat roofs with gardens, so that patients, particularly consumptives, can be in the open air as much as possible. Each patient will have 1,030 square feet space, the largest proportion of space allotted to a patient in any hospital in the world. The ultimate cost will be from $7,000,000 to $8,000,000.

The hospital will be on the "pavilion" or "cottage" plan. Each pavilion, with its sick wards, operating and lecture rooms, will form a hospital by itself, and of these there will be eighteen. The hospital will have 2,300 beds. The magnificent operating rooms will be of a new type. In the clinics for infectious diseases the patient will be separated from the professor and the students by a glass partition.

A number of medical students will live in the hospital for the purpose of close study and observation. The latest technical achievements will be utilized throughout the institution.

Cleaning Rochester's Streets

FOUR ordinances for sweeping and cleaning, embracing fifty streets, or parts of streets, have been adopted by the Common Council of Rochester, N. Y., during the year. These ordinances provided that one-half of the cost of the work should be assessed upon the abutting property and that the balance should be paid from the Street and Sewer Fund.

The surface material of the streets cleaned as aforesaid is either asphalt, asphalt block or brick. The average cost of all the sweeping and cleaning was $597.15 per mile, or $35.84 per thousand square yards. The average width of street is twenty-seven feet.

The cost of cleaning asphalt streets by day labor as shown by the records in the Street Department was $37.04 per thousand square yards, for the season, or an average of $595.98 per mile of street cleaned.

The asphalt streets were cleaned an average of 113 times during the season.

The brick streets cost an average of $24.44 per thousand square yards or an average of $386.04 per mile, and were cleaned an average of forty-two times during the season.

Medina block stone streets cost an average of $80.91 per thousand square yards or an average of $1,700.69 per mile, and were cleaned an average of 153 times during the season.

The average width of Medina block stone streets is much greater than the average width of asphalt and brick streets. The cost of cleaning one mile of Medina block stone street twenty-seven feet in width, at the rate given above, is about $1,281.93 during the season.

The cost of sprinkling the same streets averages about $354.00, making the total cost of sweeping and cleaning $1,635.93 per mile for a 27-foot street.

The asphalt streets have cost for the same average width, about $586.69 per year, or about 36 per cent. of the cost of sprinkling and cleaning Medina block stone.

Records were also kept of the cost of cleaning common Medina stone streets during the season of 1903. These were cleaned an average of twenty-four times and cost $30.85 per thousand square yards or $494.84 per mile.

The macadam streets were cleaned an average of eighteen times during the year, and cost about $24.91 per thousand square yards, or $341.12 per mile.

Municipal Art in Hartford

THE Municipal Art Society, of Hartford, Conn., recently became a permanent organization with 374 annual and honorary, and eight life members. No art society in the United States was ever organized with such a large membership. New York formed the first municipal art society in this country. Then came Baltimore and Cincinnati. Hartford's is the fourth. Mayor William F. Henney presided at the organization.

The constitution specifies that the society shall be called the Municipal Art Society of Hartford and its object: "To conserve and enhance in every practicable way the beauty of the streets, buildings and public places of Hartford; to stimulate interest in the scenic, artistic and architectural development of the city, and to encourage a greater civic pride in the care and improvment of public and private property." There shall be three classes of members: Life, who shall contribute $25 to the society; annual, who shall contribute $2 annually, payable in July, and honorary, who shall be elected by the society at its annual meeting upon the recommendation of the board of directors. The society will have the following standing committees:

Membership, street fixtures and advertising signs, civic centers and public buildings, city plan, parks, thoroughfares and playgrounds, baths and houses of comfort, permanent work, exhibitions and competitions, printing and publications, law, legislation and auditing.

The society elected the following eighteen directors: Morgan G. Bulkeley, William F. Henney, Louis R. Cheney, Flavel S. Luther, George Keller, Albert Entress, Henry C. White, Charles Noel Flagg, George S. Godard, Edward J. Garvan, Frederick L. Ford, Charles A. Goodwin, Walter S. Schultz, Mrs. Appleton R. Hillyer, Mrs. John M. Holcombe, Miss Annie E. Trumbull, Mrs. Walter L. Goodwin and Mrs. M. Toscan Bennett.

On the scroll of the seal of the society are the following words: "Civic economy, architecture, sculpture, printing, engineering, arts and crafts." Mr. Charles Noel Flagg is the first president of the society.

Sanitary Value of Meters

MR. EDWARD W. BEMIS, Superintendent of Water Works of Cleveland, Ohio, points out in his annual report that scarcely a committee or body of physicians and sanitary experts has made any report in favor of a purer water supply for any large city of this country in the past few years without accompanying the report with a recommendation for meters. This recommendation was primarily in order to so reduce the waste as to render it practicable for cities to incur the large expense necessary to secure a pure water supply. Naturally, however, all these committees of highly competent men would not recommend meters if there was thought to be any possibility of danger to health from their use, as some uninformed or prejudiced people have inferred. Rather, the meter is a decided stimulus to good sanitation, since it removes the fine that the assessment system places upon the number of water closets and bathrooms, etc., and encourages the repair of old and often unsanitary plumbing. It is well, however, to have at least the requirement of a small minimum on every consumer, not only to cover the cost of interest, depreciation and reading of the meter, but to remove the possible temptation to some to economize unduly in the use of water.

Growing Use of Concrete

THE president of the Iowa Engineering Society, Professor S. N. Williams, remarks that one of the most rapid developments of American engineering practice is the growth in the use of concrete. Thirty years ago Professor Mahan, in his treatise on civil engineering, described its use by French engineers in construction of an aqueduct thirty-seven miles long with several large bridges, a light house at Port Said 180 feet high without joints and a Gothic church with steeple 130 feet high, also thirty-one miles of the Paris

sewers. It is difficult to understand why we were so much behind the French in adopting this form of construction as well as in extended use of electric lights. Engineers are coming to see its value in Iowa, as is evidenced by completion of the highway bridge at Waterloo, a fine type of the Thacher-Melan system, the Dry Run Sewer at the same point, the Illinois Central Railroad bridge at Nashua, the water reservoir at Mason City, a corresponding construction at Marshalltown, proposed bridges at Des Moines and Cedar Rapids, and countless smaller structures, such as culverts, sidewalks, etc. The use of good concrete blocks where stone is not available is a helpful solution of the problem of cheap and fire-proof construction, also concrete steel construction for high office buildings in cities.

The Japanese Army Builds Good Roads.

One thing for which both Korea and Manchuria are indebted to Japan—twice over during the last ten years—is the construction of fine highways wherever the army has moved. No appropriation is ever made out of the taxes for the repair of the main thoroughfares in either of these countries, and hence, in the course of years the roads become badly cut and water-worn, and during the rainy season are practically impassable. While the Japanese have not metaled the new roads, which they have been steadily building from the time they left Seoul, they have, at least, by banking the centers and ditching the sides, insured the possibility of constant traffic over them, even during the rainy season, and their labor will leave an impress for several years.

Where (as is often the case) the old road has been worn by travel and water into a deep, narrow, V-shaped gully, the new work takes a fresh course, often through the newly plowed fields of the Chinese farmers, and, where lowlands or bogs exist, the roadway is often deflected to the well-drained foothills. At places where the defensive idea is paramount, the various positions are so connected as to secure great ease of communication and mobility in placing troops.—*Leslie's Weekly.*

New York's Notable Playground

New York is proverbially slow in adopting new ideas regarding the comfort, peace and happiness of its people. For years the city has been the butt of jokes because of its street car service. When almost all other cities in the country had trolleys, New York was still clinging to the antiquated cable, the horse and the stage. In the matter of playgrounds the city has redeemed itself. On September 10, New York officially opened what is probably the finest playground in the world. It is situated in Pelham Bay Park and it embraces a parade ground of twenty acres, big enough to show off a brigade of infantry; an oval running track, a quarter of a mile long; a steeplechase course, a mile long, with three natural ditches and seven hurdles; three baseball fields, a cricket field, croquet and tennis grounds, bowling alleys, vaulting and throwing grounds, a big field for lacrosse and pushball, a long line of bathhouses, a big boathouse, and a big picnic ground.

The park is the work of one man, Park Commissioner William P. Schmitt, who conceived the idea and labored over it day and night until he saw it reach fruition. The idea was his, his were the efforts that got the money from the city, and it was he who watched over its coming into being with a painstaking care that made every dollar tell of good work done. He called in the best advice possible, and now that the playground is completed experts pronounce it unique.

Thawing Water Pipes by Electricity

Mr. H. A. Lord, superintendent of water works, Ogdensburg, N. Y., reports to the commissioners [April, 1904] that no money has been received from taxation during the year. The revenue of the works has been derived solely from its own resources. Water has been furnished for all public purposes free of charge. Two thousand seven hundred and seventy-five dollars and thirty-three cents has been expended in extensions and betterments; $16,000.00 bonds and interest paid. All claims against the water funds have been provided for and the balance is to the credit of the funds, $226.28. The total receipts were $27,227.60, and the disbursements $27,227.60. The supply of water throughout the year has been ample.

The heavy rains of the late fall soaked the street bed with water, and severe freezing weather before any snow had fallen caused the streets to freeze early and hard. After the snow came it seemed to afford but little protection from the extreme severity of the weather.

Hydrant branches, covered six feet deep, were frozen solid and burst. Twelve hundred feet of six-inch cast iron main on Main street west, froze, leaving an entire district without a water supply.

A determined attempt to open up this main was at once made, the main cut open and thawing tubes of ¾-inch pipe reduced to ½ inch at the nozzle were used, in connection with steam generated by two portable boilers. About 200 feet of the pipe was thawed in this way, but it was soon found that the idea was not feasible on account of the heavy expense. Finally it was decided to use electricity for thawing.

Experiments were first made with the frozen hydrant branches on Ford street. The primary light wire, carrying 1,100 volts, was tapped and reduced by transformers to a voltage of fifty. Wires were laid from the frozen hydrant at the easterly end of the bridge to the hydrant, corner Ford and Catherine streets, and in about an hour water was pouring out of the hydrant. The next hydrant tried, thawed in forty minutes after the current was turned on. In like manner two other frozen hydrants were thawed. In another street, 600 feet of 6-inch pipe was partially thawed so that water flowed in about four hours. Having cut the main it was possible to extract the core of ice and thus economize in the use of electricity. The superintendent states that if he were equipped with a portable electrical generating outfit the current might be applied until the pipes were free from ice, but when paying for the current consumed the expense is prohibitive.

Having opened the main street pipes it was found that the pipe in freezing had split in a great number of places; break after break was dug up and repaired in the most severe weather and under the most trying conditions.

INCIDENTAL ITEMS OF INTEREST

Many Matters of Moment to Municipalities Briefly Told—Short Record of Happenings and Facts in City, Town and Village

* * * All granite blocks used by the city of Haverhill, Mass., during the year, were furnished at a contract price of $57 per thousand, the blocks being large blocks, laying twenty-five to the yard by actual count.

* * * The regular list of abutters on watered streets in Haverhill, Mass., with the frontage of each, and the amount of the assessment as authorized by the Board of Aldermen, was recently made and committed to the Board of Assessors. During the year, 132,090 feet or 25.02 miles of streets were watered at an expense of $11,027.56. The total assessment levied was $7,406.85 on a total assessed frontage of 221,666 feet at the rates of three cents per foot of frontage on dirt streets, and four cents per foot of frontage on macadamized or block paved streets, as authorized by the Board of Aldermen.

* * * The Street Commissioner of Lynn, Mass., urges that an arrangement be made with the street railway company to distribute stone and gravel by cars. The cost of laying necessary tracks to the breakers and pits and the purchase of the needed cars would soon be offset by the saving in cost of haulage.

* * * The street cleaning system of Lynn, Mass., has been modified. But seven push carts are used instead of fifteen. The change proved to be a saving and gave more satisfactory results. The cost last year per week, all weather being good, was $312. Under the present system the cost per week of good weather was $263.75, or a saving of $48.25 per week.

* * * The Bureau of Water of Albany, N. Y., reports the continued good work of the filter plant. The high percentage of bacterial removal, together with the marked decrease in the number of deaths from typhoid fever, show the wisdom of filtration. During the past year but twelve deaths from typhoid fever have been reported.

* * * It is but a few years ago that nearly every young graduate of an engineering school looked for his first employment to some railroad, chiefly to construction work. Railroad building was so active in the '80s that there were not enough trained men to supply the demand, and the promotion, up to a certain grade, was very rapid for a young man of fair capacity and industry.

* * * The jury in the third trial of Ex-Mayor Ames, of Minneapolis, failed to agree and a fourth trial was ordered. Ames was indicted for illegally receiving money from women.

* * * The Municipal Art Society of New York proposes to seek through the courts the abolition of the poster nuisance on the fence surrounding Bryant Park. A taxpayers' suit will be brought by Calvin Tomkins, president of the society, and on November 1, in the Supreme Court, Nelson S. Spencer, of the law firm of Spencer, Ordway & Wierum, counsel for the society, will move for an order enjoining Park Commissioner Pallas and Thomas McNamara and Henry C. Hart, of McNamara & Company, from using the fence for advertising.

* * * The gross public debt of the colony of New Zealand on March 31, 1903, was $279,495,095 and the net debt $267,928,900. On March 31, 1904, the gross debt was $287,611,075 and the net debt $275,321,640. These figures show an increase of $8,115,980 in the gross debt and $7,392,740 in the net debt. After the reproductive loans are eliminated—money borrowed for advances to settlers and for loans to local bodies, money obtained to purchase estates for close settlement, and other loans of a reproductive nature—the "normal" debt per head has decreased 11¼ per cent. since 1893, namely, from $177.52 to $157.60.

* * * From a study made of 16,719 house water meters in the city of Cleveland, Ohio, it was found that only 1,346, or 8 per cent., were paying more than the flat or assessment rate; while 92 consumers, or less than 0.6 of 1 per cent., were paying the same as the flat rate, and the remainder, 91 1-3 per cent., were paying less under the meters than they had paid previously.

* * * The Supreme Court of Iowa has decided in the case of Huber vs. Cedar Rapids and Marion City Railway Co., that if a person riding on the platform of a street car, leans over the side of the platform and is struck by something, or through any negligence of his own is injured, the company is not responsible. It was further held that if a person voluntarily extends his arm from the side of the car or puts his head out a window, he does so at his own risk. The plaintiff had leaned over the side of the platform in order to see where some smoke was coming from and had been struck by a trolley-wire pole, located about two feet from the platform.

* * * In a recent decision, the Supreme court of Mississippi held that a municipality has a right to trim trees in order to install an electric lighting system. The town of Hazlehurst was sued by one of its property owners for trimming the trees in front of his property, in order to put up some electric light wires. In handing down the decision the Court held that a municipality has full jurisdiction over the highways within its limits.

* * * In the recent case of McCaffrey vs. City of Omaha, the Supreme Court of Nebraska held, that in order to repave a street and tax the owners of the abutting property for it, it is first necessary to receive a petition from the property owners to have the street repaved. The pavement on a street had become so rotten and decayed that it was necessary to remove the whole top and put on another. In cities of a metropolitan class the charters provide that such work is termed "repaving" as distinct from "repairing." The City of Omaha termed the work "repairing" and hence the suit.

FIRE-ALARM TELEPHONES*

The Limitations of the Telephone for Fire-Alarm Purposes—Its Advocacy the Result of Commercial Telephone Interest

By Adam Bosch

The great benefits derived from the use of the telephone in the business management of the fire departments of the larger cities cannot well be overestimated. By no other agency can the same facility of intercommunication between the different units of a fire department be attained. While this is universally acknowledged, its use as a substitute for the fire-alarm box has met with little or no favor from those in charge of fire alarm systems, and its advocacy is principally in the hands of those identified with the telephone interest.

Reasons for Use of Telephone

The reasons advanced by those favoring the use of telephones for fire-alarm purposes are mainly based on the fact, that the number of telephones in use in any locality far exceed the number of fire-alarm boxes, and that by reason of this, in case of fire, a telephone would always be more quickly available than the more sparsely distributed fire-alarm box. The latter could consequently be dispensed with, which would result in considerable saving to municipalities. They claim also greater efficiency for the telephone, inasmuch as a person may not only give a notice of fire, but also, at the same time inform the fire department of its nature and extent.

In how far these claims for the telephone are sustained by facts, and where it fails to meet the diverse requirements of fire departments in village, town or city is the subject of this paper.

That fruitful subject for discussion, the delays, mistakes and poor service generally charged against the telephone central office will not be considered, for such troubles are local and incidental, and the companies are daily giving proof of their desire and success in minimizing them. Only such objections to the use of the telephone for fire-alarm purposes shall be made as I deem to be inherent in the telephone or the telephone system, when considered in relation to the fire-alarm service.

Telephones Unreliable in Fire-Alarm Service

The conditions of fire departments in village, town and city are not the same and their requirements in regard to an efficient fire alarm are different.

The greatest number of fire departments are volunteer departments in villages and small towns where the firemen sleep at their own homes, and follow their daily vocations in the store, factory, or on the streets, a statement of these conditions is sufficient to prove that it is practically impossible to summon such a department to a fire by means of the telephone. It might be contended that telephones could be used to notify some factory to blow its whistle or some church janitor to ring his bell, but this would manifestly be a slow and very uncertain process, especially at night. Contrast this with the promptness of the fire-alarm box, almost before the person giving the alarm can remove his fingers from the hook any desired number of bells may strike or steam whistles blow, automatically, and simultaneously, giving to the firemen the exact location from whence the alarm proceeds.

Next in number are the partly paid fire departments where usually only a sufficient number of men are permanently appointed to each company to take their apparatus to the fire, the rest are "call" men; such a company responding to a telephone alarm of fire would be powerless on their arrival until reinforced by the call men, who could not be promptly summoned by telephone.

Next come the fully paid fire departments in cities having an automatic fire-alarm telegraph. Here every engine and truck company is permanently assigned to respond to alarms from certain boxes. On completion of the first round from a box the horses are hitched to the apparatus and the men are on their seat ready to leave quarters. How slow in comparison with this would be the response to a telephone call to each company. Of course any one having a telephone may, on the discovery of a fire call an engine or truck company, and the apparatus summoned may be able to put out the fire, but some very disastrous fires have occurred where this has been permitted. A fire is an unknown quantity until put out, and the discoverer of one is seldom a judge of what is required to extinguish it. To permit this to be done is to invite disaster. In the permanent assignments the relative numbers of engines and trucks to certain boxes is made with a view to the possible requirements of the neighborhood in which the boxes are located.

Advantages of Regular Fire-Alarm Service

On receiving an alarm from any box every company knows instantly whether they must respond or not; no verbal instructions are required. I cannot see how a telephone system could be devised to accomplish this with anything approaching the automatic fire-alarm system in reliability and promptness.

In the larger cities having a manned fire-alarm system where operators are in constant attendance the case is somewhat different. The operator may receive a notice of fire by telephone and transmit it manually on the gong circuits the same as one received from the box, but not as expeditiously, he must obtain from the person on the other end of the telephone either the name and number of the street or his telephone number, if the former he must consult his map, if the

* Paper read for discussion at the meeting of the International Association of Municipal Electricians at St. Louis, Sept. 13-14, 1904.

latter his telephone list, in order to determine the nearest box station before the alarm may be transmitted, and in this way much valuable time is lost. The information an operator obtains in this way is often fragmentary and imperfect, the tendency in an excited person appears to be to yell into the transmitter the fact that there is a fire and then leave the telephone; to call the person back for further necessary information is often attended with great difficulty and sometimes impossible.

In the development of the fire-alarm box it has been the constant endeavor of the manufacturer to eliminate the personal equation from its operation as much as possible; in this he has succeeded in a remarkable degree; it is hardly possible for any one to make a mistake in operating a box. No matter how low the intelligence of one person, or how great the excitement of the other, both will operate the box with equal facility, and the operator need not, as he would under equal circumstances receiving a telephone alarm struggle with the one and gradually draw from him the necessary information, or wasting precious time cooling down the excitement of the other. The box has this further advantage that we may have a record of its operation for verification as well as for preservation.

Why the Telephone Fails

In the use of the telephone for fire-alarm purposes the personal equation enters very largely. Giving a notice of fire by telephone is a matter between the discoverer of a fire, the operator at the telephone central, and the operator at fire alarm headquarters with no record for verification, that misunderstandings and mistakes are more liable to occur under such conditions than when the alarm comes from a fire-alarm box will be readily granted.

Some persons voices are not well adapted for telephone conversation, others have defects of speech, add to this, the excitement incident to the discovery of a fire and we can easily understand why an operator is not in a very happy state of mind when receiving a telephone alarm; to fully realize this one must have encountered an excited Italian on the other end of the telephone trying to call the fire department.

In the transmission of an alarm from a signal box there is no unknown quantity of time, its action is instantaneous. In the problem of the transmission of an alarm of fire by telephone a number of unknown quantities of time exist. The time consumed by the sender to obtain the attention of the central, the time required by central in making connection with fire-alarm headquarters and obtaining the attention of the operator, the time consumed by operator to obtain particulars about location of fire, and finally the time required by operator to determine by reference to his map or telephone list the number of the nearest signal stations to the locality. Theoretically some of these unknown quantities may be very small, but practically we know that their sum total of time is often very large, and it may easily be demonstrated that if an alarm from a fire-alarm box and one from a telephone were started precisely the same moment under conditions most favorable to the telephone, the alarm from the box would be transmitted and the fire apparatus well on their way to the fire before the telephone alarm would be ready for transmission. There are other and weighty reasons which absolutely limit the use of the telephone for fire-alarm purposes.

Telephones Not Always Accessible

On holidays and at night when stores and factories are closed most fires are discovered from the outside by the police or passing citizen, at such times telephones are not available, but the nearest street box is always accessible. The same conditions exist in the residential sections at night. In every great city large areas are occupied by tenements principally inhabited by foreigners where telephones are few; fire-alarm boxes conveniently located give ample protection. In such places the fire-alarm box has the additional advantage, that a foreigner discovering a fire will not be obliged to wait and become proficient in the English language before he sends in the alarm.

From the foregoing considerations we may safely draw the following conclusions:

That in a volunteer or partly paid fire department the use of the telephone is entirely impracticable.

That in a fully paid fire department with an automatic fire-alarm telegraph system the telephone as a means of giving alarms of fire is impracticable unless operators are constantly in attendance to transmit these alarms to department. The cost of this would in many cases be prohibitive, and the results in promptness and reliability would not equal the results derived from the use of fire-alarm boxes unless the latter were an unreasonably long distance apart.

That in a manual fire-alarm system the telephone as an anxiliary is an occasional benefit and its use should not be discouraged, but in case of a fire the fire-alarm box should always be the first consideration. The telephone should be used like a home remedy in an emergency, use it, but first of all send for the doctor—the fire-alarm box.

Acetylene and Fire Insurance.

Referring to the subject under the above title, Mr. Giles W. Mead says:

"Aside from the safeguards which have been placed around the manufacture and installation of acetylene generators, it is a fact that only one-twelfth as large a quantity of acetylene is required as of the familiar city gas to do an equal amount of lighting; and for this reason acetylene, so far as the piping in a building is concerned, the burners used, etc., is less hazardous than city gas.

"It should be borne in mind, also, that the ordinary city gas burner, if left open, will pass six cubic feet of gas per hour, while the acetylene burner, if left open, will pass only one-half of one cubic foot per hour. Therefore, the time required to produce an explosive mixture of acetylene and air in the same space would be much greater than in the case of ordinary city gas, because of the much smaller quantity of acetylene that could escape through the open burner.

"A simple calculation will show that it would be impossible to obtain an explosive mixture of acetylene and air in an ordinary room, even if more than one acetylene burner were left turned wide open during an entire night.

"Acetylene generators are built to contain certain specific quantities of calcium carbide, and cannot contain more than the rating given each one. The average size of generator in common use can be charged with only enough calcium carbide to produce about fifty cubic feet of acetylene, and that quantity would not be sufficient to create, in a room of ordinary size, a mixture which would ignite, even if brought in contact with an open flame. This, too, even if no allowance whatever is made for ventilation. A serious escape of acetylene would be possible only in case a gas pipe were broken, and as acetylene has a very strong odor a leak would be noticed instantly. Comparing again with city gas, it will be seen that in the extreme case of a broken pipe in a house, acetylene would be less likely than city gas to cause an accident or a fire, as the quantity of acetylene would be strictly limited by the carbide capacity of the generator, while city gas would continue to flow indefinitely from the street main.

"As to safety of property from fire loss, we admit that the *greatest possible safety* in this respect would be attained if the acetylene generator could be placed outside of the insured premises. It is *equally* true, however, that a building would be safer as against loss by fire if the cook stove, heating apparatus and all forms of artificial lighting and heating, including matches and electric wires, were kept outside of the building. This condition, while it might be considered most desirable, is, of course, impracticable, as all kinds of artificial light and heat cannot be kept outside of buildings.

"The introduction of an acetylene generator into a building usually means the abandonment of the use of kerosene oil lamps, or a gasoline lighting system, or of electric lighting. The question, therefore, is whether acetylene generated by a "permitted" machine, properly safeguarded, is a greater or lesser hazard than kerosene oil or whatever illuminant it displaces. The millions of dollars of loss every year caused by each of the other illuminants seems to indicate that acetylene is certainly not the more hazardous. While a comparison of total valuations as against losses cannot be actually made, it is known that the greatest number of fire losses to insurance companies from acetylene in the United States in any one year was eleven, averaging a little more than $1,000 each; and that during that year there were approximately 46,000 buildings lighted with acetylene.

"The acetylene industry, however, is very anxious that insurance men should have full knowledge of the actual facts as to acetylene as a fire hazard, believing that the record is a good one from an insurance standpoint.

"The use of acetylene has increased very rapidly and very steadily since its discovery. At the present time acetylene is being introduced for lighting into buildings of all kinds and descriptions at the rate of from twelve to twenty thousand per year, and the number of new installations per month is increasing constantly.

"The loss to fire insurance companies from acetylene would be likely to be greater during the earlier years of its development, before its use was well understood and safeguarded, as it is now; but in spite of this fact, the actual figures of losses are very small, as has been shown.

"There was formerly a feeling on the part of many persons, including transportation and insurance companies, that calcium carbide itself was dangerous, that it could explode under the same conditions that would cause an explosion of dynamite, etc. The fact is, that calcium carbide is absolutely unaffected by heat, cold, or concussion. It is packed uniformly in iron drums; the railroad companies of the United States have handled literally thousands of tons of it yearly for the past five years; and there has never yet been a single case of loss, or even a claim for loss, due to the storage or handling or transportation of calcium carbide in the original package.

"It is well known, of course, that calcium carbide will generate acetylene immediately upon being brought into contact with water or moisture in any form, but the packages in which carbide is packed are air and water tight. During the tremendous flood at Kansas City, in 1903, a warehouse containing between thirty and forty tons of calcium carbide was completely submerged and in the midst of the swiftest current for eight days. After the water receded the carbide was recovered, practically without loss."

♣

Finger Prints and Tramps

The Halifax *Guardian* points out that the identification of criminals, as may be gathered from a case in the Halifax Court recently, has been completely revolutionized by the system of finger print impressions introduced by the present Commissioner of the Metropolis. Thanks to this official, it is claimed that identification is as complete and perfect as it is possible to get it. Under the old method identification depended principally upon the memories of the various detective officers in recognizing photographs and conspicuous marks upon the persons of criminals. But the system of recognition by finger prints has entirely altered this. If the finger impressions of a man convicted when sixteen years old are taken, and then again when he is sixty-six, his identity will yet be established.

The remarkable success and utility of the system has led to an interesting suggestion locally, and it is this—that the finger impressions of all tramps and traveling beggars—the class of people who are more or less a menace to the country—should be taken. In support of this opinion it is pointed out that under the present system of punishment for these people, it invariably happens that a man charged with begging tells a long story as to how he is in search of work, and a sympathetic Bench admonishes him and asks him to leave the town. The reason is that magistrates may be anxious to mete out punishment to those vagrants who deserve it, but on the other hand, they may feel that in trying to properly appropriate the punishment they may unintentionally give a term of imprisonment to a workman down on his luck, and really on the road in search of work. If the Registry at Scotland Yard took the matter up, and the police throughout the country "finger-imprinted" this class of people as they got into their custody, there would be conclusive proof as to who were the actual professional beggars, as distinguished from the men on the road. The identity of those people established, confidence would be

given to the magistrates in meting out severe punishment in cases where it was called for, and it would bring about a consistent application of the Vagrancy Laws, with no hardship to the man who was really a bona-fide workman. It is claimed that as the tramping beggars fell into the hands of the police from town to town, and their convictions followed them, the punishment would be such as to practically drive them off the road to seek something like decent and honest employment. The dealing with vagrants at the present time by Justices throughout the country is urged to be more or less an encouragement to vagrancy. Under the finger print system there is no hiding the past, and there could be no recurrence of the Beck case, where the evidence of previous convictions depended upon a recognition of the person. Identification would be established, not by the man who arrested a person, but by the finger impressions of that person. Another important fact is that by the old system of photographs—which did not always succeed—it cost $2.50 or more, to identify a man, whereas it can now be done at a cost of a postage stamp. If Watch Committees and Boards of Guardians took into consideration the suggestion to extend the system to tramps, and made some representations to the Home Office, it might induce them to adopt it.

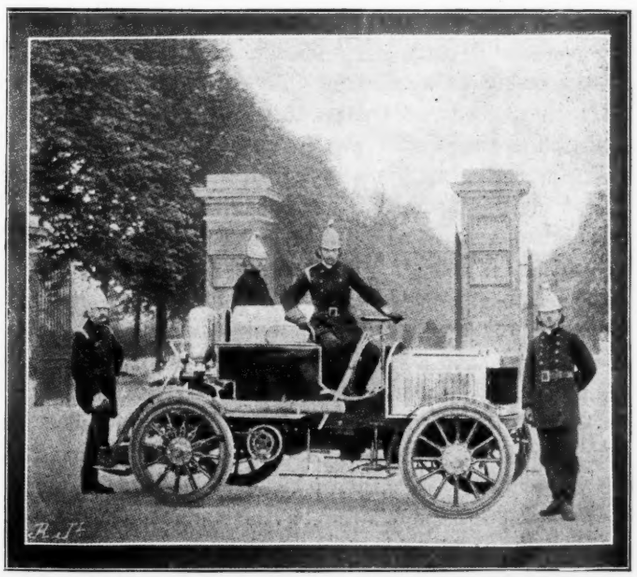
A Gasoline Motor Fire Engine *

To England is due the credit of having placed on her own roads the first fire engine in which a gasoline motor is used to propel the vehicle and also to drive the pumps.

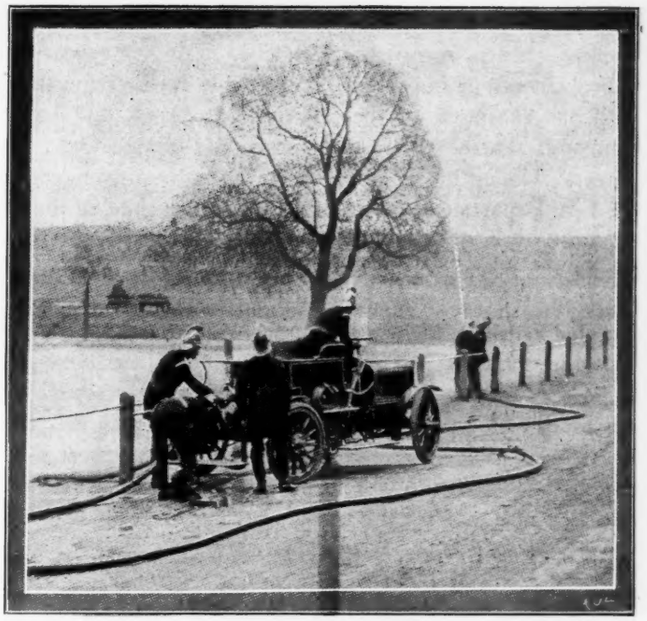
In the front, under the bonnet, is a 30-h. p., four-cylinder, vertical gasoline engine, which drives through a three-speed and reverse gear box of the sliding spur-wheel type, the power being transmitted to the road wheels by side chains. The propelling mechanism is thus in every way similar to that of the majority of present-day automobiles.

For driving the three-throw Hatfield pump, which has a capacity of 300 gallons per minute, a separate spur-wheel is keyed to the second-motion shaft, the shaft being prolonged behind the gear box to receive it. A sliding gear wheel on a separate longitudinal shaft, that passes rearward to the pumps, can be caused to engage with the pinion at will, and, when engaged, the pumps are driven through a single reduction gear at the rear end of the shaft.

* Courtesy of *Automobile Topics*.



AN ENGLISH GASOLINE MOTOR FIRE ENGINE—SIDE VIEW



AN ENGLISH GASOLINE MOTOR FIRE ENGINE IN FULL OPERATION

As will be understood, the three-speed gear is still available for the pump, although for ordinary purposes the top speed only is employed.

A very simple jaw-clutch is employed for disengaging the sprocket wheels of the side chains before the pump is set running, the sprocket shafts being carried by brackets having very long bearings.

To transfer the engine power from the road wheels to the pump is only the work of a moment. A small lever on either side of the chassis releases the jaw-clutch of the side chains, and another lever throws the pump shaft pinion into gear; the pumps then immediately begin working.

The practical demonstration of this fire engine's capabilities was in every way satisfactory, very good speeds being obtained both on the level and up hills of varying gradient—up to 1 in 9 on Blackheath Hill.

England is not to have the honor of retaining this vehicle, as it has been built to the order of Lord Rothschild, and is, we understand, about to be dispatched to France. We can only hope that this country will not be long without fire engines of this type, which are apparently so eminently suited to the work they have to do.

The Janesville Fire Department

In 1852 the Janesville, Wisconsin, Fire Department was organized, and it was at that time a "bucket brigade," and was composed of willing volunteers who did valiant service with buckets and hand pumps. A home-made hook and ladder truck was procured. It was not until June, 1855, that two engines of the Button pattern were received. They

were shipped by way of the Erie Canal and the lakes to Milwaukee, thence by rail to Janesville. For some years no improvements of importance were made in the department with the exception of the addition of a hook and ladder company. In 1885 John C. Spencer was elected Chief Engineer. Under his administration many improvements in the Fire Department were made. Up to this time all the fire apparatus was drawn by men holding the drag ropes, and taking the places of the horses of to-day; this was quickly changed, the old hose carts were disposed of and four-wheeled carriages drawn by horses, were procured; horses were hired for services on the engines and drivers were paid to be ready at all times. The membership was reduced to minimum and a part paid "call system" was adopted; contracts were made for an alarm system, which was not placed in operation, however, until the fall of 1887. In 1887 Henry Blunk took up the work. During his administration the water works was built and many improvements made in the Fire Department, including the purchase of the aerial ladder and truck. In 1890 Henry C. Klein was appointed city electrician, with detailed supervision over the entire fire alarm system. Under his supervision many improvements have been made until to-day the fire alarm system stands second to none in cities the size of Janesville. Forty street boxes have been added, making a total of sixty in all; one six-circuit repeater, one automatic box transmitter—from which any box in the city can be pulled from the central station.

On April 19, 1897, the membership of the Fire Department was placed under the control of the Civil Service Commission, working under the State law.

The present equipment of the Janesville Fire Department consists of two fire stations, with necessary apparatus distributed on both sides of the river; seven horses, owned by the city and two by the Fire Police Company; the apparatus consists of one aerial truck, one steam engine, No. 2 size; one combination patrol and chemical wagon; two hose wagons, one combination hose and ladder wagon, and Chief's buggy. The city has supplied some 300 hydrants for the use of the Fire Department.

The department now has six full paid men, and twelve call men when the ranks are full. At the head of the department is Henry C. Klein, the present Chief Engineer.

The efficiency of the electric fire alarm system is largely due to Chief Klein's untiring energy in keeping it in perfect order.

Of the present department with its splendid equipment of officers, men, horses and apparatus, much might be said, but happily its record speaks for itself, as its effective work performed, places it on a par with any paid department in cities the size of Janesville.

The Janesville Fire Police, also, has an interesting history.

Carefully stored away in the desk of the secretary, is an old leather-covered record book with this inscription on the title page: "Records of Janesville Sack Company, 1882." On the first page we find the following:

March 18, 1885. Pursuant to a call to the business men of this town, a number met last evening. So many complaints are being made that goods are stolen from houses at time of fires, and property destroyed, it is suggested that we organize as a body with full police power as well as firemen. Jed M. Hazleton offered the following resolution: That a company be formed of twenty, all to be business men of the city, who shall be provided with a sack to hold small articles, and a lantern. The said company shall have full police powers at all times, and at fires they shall protect and care for property, and shall be called Janesville Sack Company No. 1. In June, 1889, the name was changed to the Janesville Fire Police, and a complete fire wagon and equipments were purchased by the company. Chemical extinguishers and rubber covers were a part of the equipment, and the work done the first year was noticed by the chief engineer in his annual report.

INSURANCE PATROL AND SALVAGE CORPS, MILWAUKEE—WAGON EQUIPPED WITH FIRESTONE SIDE WIRE RUBBR TIRES

In the fall of 1902 the old wagon was giving out and a committee was appointed to secure a new one. It was expected to expend about twelve hundred dollars for a new outfit. A number of plans and styles were submitted, but when the Chicago Fire Extinguisher Company came with a propostion to build a wagon, different from anything in the country, all steel, box and gear, with a perfect chemical engine, the offer was accepted, at a price double what was first talked of, the wagon costing twenty-one hundred and fifty dollars, but it is complete in every respect, and with it the company is doing splendid work. To sum up, the Janesville Fire Police is the only company of its kind in the United States; a full chemical equipment and patrol wagon with an outfit costing over three thousand dollars, twenty business men who give their time free, night or day, to work at fires, two drivers, paid men. All this is private property.

Police Chiefs in Convention

THE sixth annual convention of the New York State Association of Chiefs of Police was held in the court house at Binghamton, N. Y., on October 27. It was the largest convention in the history of the Association, and in his address President Bull, of Buffalo, gave credit to Chief Moore, of Binghamton, for bringing about such a splendid attendance.

The Association was organized in Rochester, November 30, 1901. Eighteen chiefs were present at the organization. There are now on the rolls forty-three active and 106 honorary members. The latter include the mayors and village presidents, as well as the police commissioners of the various towns and cities represented in the Association.

Chief Richard Sylvester, of Washington, D. C., made a very fine address in which was incorporated a part of a paper which he prepared to read before a prison congress recently held, but which he reserved to present at this convention. It was descriptive of the meeting of the International Association at St. Louis and of the benefits derived from the meeting.

Brief impromptu speeches were also made by Chiefs Hyatt, Swift, Brady, Bell, Ross, Cleary, Baxter and Eastman.

The following nominations were reported and by unanimous vote the nominees were declared elected:

President, Frank J. Cassada, of Elmira; vice-president, William Moore, of Binghamton; secretary and treasurer, William J. Coughlin, of Troy; members of the Board of Governors—three years, Charles F. Cleveland of Utica, Charles LaR. Molyneux of Lockport, and Charles McCabe of Poughkeepsie.

It was decided to accept the invitation of Mayor Hyatt to meet next year in Albany, September 14.

The Chiefs present were: William S. Bull, Buffalo; Joseph P. Cleary, Rochester; Secretary William Coughlin, Troy; John F. Ryan, North Tonawanda; George H. McGlynn, Ogdensburg; Charles F. Cleveland, Utica; James Ryan, Corning; Charles Johnson, Gloversville; Frank J. Cassada, Elmira; William C. Bell, Auburn; Daniel Kane, Geneva; Thomas Barry, Rome; Ewing E. Barns, Cortland; Charles LaR. Molyneux, Lockport; James L. Hyatt, Albany; William Moore, Binghamton; Michael J. Hickey, Hornellsville; W. S. Baxter, Watertown; Charles J. McCabe, Poughkeepsie; John J. Jameson, Cohoes; J. D. Brinckherhoff, Middletown; James L. Lane, Hudson; E. J. Brady, Dunkirk; William H. Ross, Fulton; C. E. Brooks, Waverly; Wilber Bradley, Oneonta; J. D. Swift, Olean; Emanuel Perrott, Newburg; William H. Robinson, Owego, and W. H. Birdsall of Lestershire.

In the evening a banquet was served at the Arlington Hotel. Those present besides the out-of-town guests were Mayor S. L. Smith, Police Commissioners Charles W. Gennet and Jonas M. Kilmer, Harry C. Olmsted, judge of the City Court; B. Roger Wales, local Police Attorney, and Charles W. Baldwin, city editor of *The Binghamton Press.*

Fire and Police Personals

—A. T. Crane, of Rahway, N. J., has been elected fire chief.

—The rumor that Fire Chief Trickett, of Kansas City, is to be removed, is denied on every side.

—Chief Sullivan, of San Francisco, will find a new $3,000 automobile awaiting him on his return to duty.

—Fire Chief Cline, of Wheeling, W. Va., wants to take the department out of politics and place it under civil service rule.

Chief Archibald made the presentation speech, which was responded to by Messrs. J. T. Graydon and Fire Commissioner Faran.

—Chief Mooney, of Bridgeport, Conn., is making a commendable and vigorous fight against the storage of gasoline above ground.

—Assistant Chief C. E. Wood, of Salt Lake City, resigned recently to go on a ranch at St. Anthony, Idaho. He entered the department in 1894.

—Frederick Marko, a member of Engine 35, Philadelphia, has been appointed as supreme corresponding engineer of the American Order of Steam Engineers.

The tablet was placed in the wall on the west side of the station, and contains twenty names of volunteer firemen who afterward became prominent in Cincinnati.

—Captain William H. Gampher, of Engine 3, Philadelphia, has been retired on a pension. He was a member of Marion Hose in the old volunteer department, and the oldest member of the department.

—Ex-Chief William T. Cox, of Elizabeth, N. J., has been re-elected president of the Board of Fire Commissioners for the fourth time. He was presented with a gavel made from wood cut on Lookout Mountain, Tenn.

—Chief McQuade, of Chattanooga, Tenn., has received a large number of letters from prominent members of the International Association of Fire Engineers, expressing sympathy on account of his recent illness.

—Fire Chief Horton, of Baltimore, Md., who has been on a month's vacation, visiting Louisville, St. Louis, Philadelphia, Trenton and other cities, states that the Baltimore department is on a par with any other in all details.

—A memorial tablet in honor of volunteer firemen who served in the Cincinnati department prior to 1866 was dedicated at the No. 10 station, November 6. The tablet was presented to the department by the residents of the Eighth Ward.

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

British Sewage Works, and Notes on the Sewage Farms of Paris and on two German Sewage Works, by M. N. Baker, Ph. B., C. E. New York, Engineering News Publishing Co., 1904. Cloth, 8vo., 146 pages. Price, $2.00.

In this volume a very good description is given of twenty-two Municipal Sewage disposal works in Great Britain, also of the works for Frankfort and Wiesbaden in Germany and the Sewage farms of Paris. Of the British works, sixteen refer to treatment by septic tanks and contact beds, three to sewage farms, and three to chemical processes. The list embraces the places where the best-known experiments have been made in recent years, and the descriptions were written by the author after a thorough personal examination during a tour ending in June, 1904. The statements and data presented are all semi-official, as the manuscript relating to each case was first submitted to and revised by the engineer, chemist and manager in responsible charge, and hence they are of special value.

The author has made a thorough study of the subject of sewage treatment for the past ten years, and is fully qualified to probe into all the details of the work. In this book he has given in clear and compact form a large amount of valuable information relating to the best modern practice of sewage disposal, which cannot fail to be highly appreciated by every experienced sanitary engineer, and to be of great interest to the authorities of all municipalities where sewage must be subjected to some degree of purification.—E. Kuichling.

♣

Earth Dams. A Study. By Burr Bassell, C. E. New York, Engineering News Publishing Co., 1904. Cloth, 8vo., 68 pages, with 31 illustrations. Price, $1.00.

The author has given a very clear and interesting exposition of the principles to be observed in the preliminary investigations and construction of earthen dams for impounding water, and has enriched his work with many illustrations. He gives an excellent description of the large Tabeaud Dam in Amador County, California, which was built under his supervision in 1902, and uses it to exemplify certain principles of construction upon which he puts special emphasis. Illustrated descriptions are also given of the earthen embankments used in connection with the new Croton dam, Jerome Park and Wachusett reservoirs, Druid Lake and San Leandro dams.

The book is a valuable addition to the literature of the subject, and should find a place in the library of every engineer.—E. Kuichling.

♣

The *Annual Report of the State Engineer and Surveyor of the State of New York* (Edward A. Bond), for 1893, comes to us through the courtesy of William Pierson Judson, deputy State engineer. The report is copiously illustrated, and contains comprehensive maps and tables.

A section of the report is given up to the proceedings of the fourth annual good roads convention of the boards of supervisors of the State of New York, held in Albany, N. Y., Jan. 20 and 21, 1903. The report of these proceedings contains much matter of interest and importance to all citizens of the State. Mr. Bond assured the convention that the work in connection with highway improvement under the Higbie-Armstrong law had gained more headway during 1902 that all of the preceding years. That year the Legislature appropriated more money than in all of the preceding years—$795,000. The delegates came in convention with money voted by the boards of supervisors for their half of the roads to be constructed of something like two millon and eighty thousand dollars. It will, he said, take upward of two million dollars from the Legislature to wipe the slate clean. Three million dollars for the construction of roads would put us in line to lead any other State in the Union when these roads are completed.

In 1898 there was placed upon the statute books a State Aid law, known as the Higbie-Armstrong act, which provided that 50 per cent. of the cost of the roads built in the county should be paid by the State, 35 per cent. by the county, and 15 per cent. by the towns benefited. That same year seventeen counties in the State petitioned for 502 miles of highway, and adopted plans for the construction of 21 miles. The work was all experimental, and the petitions were for small sections. The supervisors of the counties were fearful of the cost. In January, 1902, there were petitions for 1,308 miles of highways, and during the ensuing year petitions were received for 1,105 miles more. The counties were convinced that the method of the apportionment of the cost was equitable, the results beneficial, and the increased tax rate a burden on the people.

Mr. White, of Oneida, explained to the convention that the care of the roads under the money system, put into a nutshell, is simply this: Shall we discontinue the payment of our taxes in labor for the care of the highways and pay that tax in money, and have it expended by the highway commissioners? That is the whole money system. Discontinue the payment of your taxes in labor and pay them in cash.

A strong argument in favor of a compulsory wide tire law grew out of a contract that was let in the county of Monroe, in the town of Greece, for construction of road. A resolution was presented to the board of supervisors for the adoption of a compulsory wide tire act. The residents of the town of Greece held a meeting and passed a resolution notifying their supervisor that if he favored the wide tire law they would retire him. The contract was let for this riad; the contractor stated that he would not employ any teams upon the road in drawing stone or dirt that were

*Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

not equipped with wide tires. He employed about eighteen teams drawing stone for a space of three weeks, and it was found that the vehicles passing over the improved road with those wide tires had put them in better condition than they were before, and the same people that called the meeting against the resolution, called another meeting and demanded that if their supervisor did not favor the wide tire law they would retire him.

♣

The forecast of the *Century Magazine,* for 1905, contains much of interest to those who are interested in municipal improvement and engineering progress. Among the mass of interesting material to be published during the year is a series of great inventions described by their inventors, which includes *The Arc-Light,* by Charles F. Brush; *The Air-Brake,* by George Westinghouse; *The Transmission of Power,* by Nikola Tesla, and *Electric Traction,* by George J. Sprague. An article of extreme interest will be *The New Method of Purifying Water;* explained by Gilbert H. Grosvenor, author of the recent article on *Inoculating the Ground.* The subject of American Public Architecture will be treated with examples of new and important works. *The Century* has paid special attention to the achievements of American artists and architects. Readers of the magazine will recall the interesting and authoritative paper on "The New West Point" which appeared in the number for July, 1904, with graphic illustrations by a number of artists. Similar articles will appear during the coming year, each one prepared with the special co-operation of the architects of the buildings. The subjects treated will be: "The New Naval Academy," "The New Custom House in New York," "The New Congressional Buildings," "The Capitol Extension," "The New National Museum," and "The New York Public Library." There will also be papers on the "New Small Parks of Chicago" and on "Outdoor Boston."

♣

Articles in American Periodicals

In *Electrical World and Engineer,* New York, October 22, 1904, is an article on *A French Municipal Electrical Plant.* This is a description of the municipal electric light plant of Lyons, France, which is the largest of its kind in Europe.

The Iowa Engineer, September, 1904, published by the Engineering Department of Iowa State College at Ames, Iowa, contains two articles: *Efficiency Tests of Pipe Coverings,* by H. T. Borsheim and L. C. Moody and *Mine Surveying Methods,* by L. E. Young. The latter article was begun in the June number. $1.00 a year or 30 cents a copy.

Glasgow's Great Record, by Professor Frank Parsons, Ph. D., Dean of the College of Liberal Arts, Ruskin University, is an exhaustive paper on the success that Glasgow has attained by municipal ownership of the street railways or tramways, as they are called in Great Britain. It is published in *The Arena,* Trenton, N. J., November, 1904.

Senator Francis W. Parker, of Illinois, spent the past summer in Great Britain studying the English municipal institutions. In *The World To-day,* Chicago, Ill., for November, 1904, he describes what he found in *British Municipal Practise Versus American Municipal Theory.* Price, 10 cents.

In *The Engineering Record,* New York, October 29, 1904, is an article on *Bitulithic Pavement in Street Railway Tracks.*

The Proceedings of the American Society of Civil Engineers, New York, October, 1904, refers, among the current literature, to *The Development and Importance of Fire Calls and Alarms,* by James Sheppard, A. I. E. E., published in *Electrical Review,* London, Eng., September 23, 1904; *Refuse—Consuming and Gas Producing Furnace,* in *Mechanical Engineer,* Manchester, Eng., September 24, 1904; *Reinforced Concrete Sewers in Wilmington, Del.,* in *Municipal Engineering,* Indianapolis, October, 1904. Price, 25 cents; *The Wood-Stave Conduit of the Atlantic City Water Works,* in *The Engineering Record,* New York, September 17, 1904; price, 12 cents; *Air Lift Pumps,* by W. H. Booth, in *Electrical Review,* London, Eng., September 23, 1904; *Copper Sulphate Treatment of Lakes Clifton and Montebello, Baltimore Water Works,* by Alfred M. Quick, in *Engineering News,* September 29, 1904, and *Engineering Record,* September 24, 1904, both of New York City.

Cement Age, New York, for October, 1904, contains an article on *Collective Portland Cement Exhibit and Model Testing Laboratory of the Association of American Portland Cement Manufacturers, World's Fair, St. Louis, Mo.* As the title of the article indicates, it is the Portland cement exhibit at the Fair and will be of interest to every engineer.

The Engineering Record, New York, November 12, 1904, contains an illustrated article about the New York subway, entitled *The Signal System on the Subway Division, Interborough Rapid Transit Company, New York.* In the same number an article is started on *The Mechanical Filters of the Hackensack Water Company,* with a number of diagrams, and also an illustrated article on *The Million-Gallon Water Tower of the East Providence (R. I.) Water Company.*

The November number of *Concrete,* Detroit, Mich., contains an illustrated article on *The Galveston Sea Wall.* The illustrations give an idea of the way that Galveston will be protected, in the future, from the invasions of the sea. In the same magazine is an illustrated article entitled, *A Resumè of Some Tests on Concrete Steel Beams,* by Julius Kahn.

Extension of Dam and Paving of River Bank at Des Moines, Ia., by C. B. Burdick, C. E., is an illustrated article on the extensions that have been made to the Des Moines Edison Light Company's dam in the Des Moines river. Another illustrated article of interest is *Electrolytic Corrosion of Water Pipes at Bayonne, N. J.* Anyone interested in road making will find in *The Cementing Power of Road Materials,* by Logan Waller Page and Allerton S. Cushman, together with the accompanying tables, much valuable information. These three articles together, *The Failure of a Small Brick Reservoir at Winston, N. C.,* by J. L. Ludlow, M. Am. Soc. C. E., are in *Engineering News,* New York, November 17, 1904.

A BOON TO CLEVELAND SHIPPERS

THE merchants and shippers of Cleveland, Ohio, are to be congratulated upon the completion of Smead's rolling road, which has been built and put into operation at Factory street hill by its inventor, Col. Isaac D. Smead.

The completion of this rolling road has solved the problem of hauling up the steep grade which has long been a source of trouble and loss to the shippers on the flats.

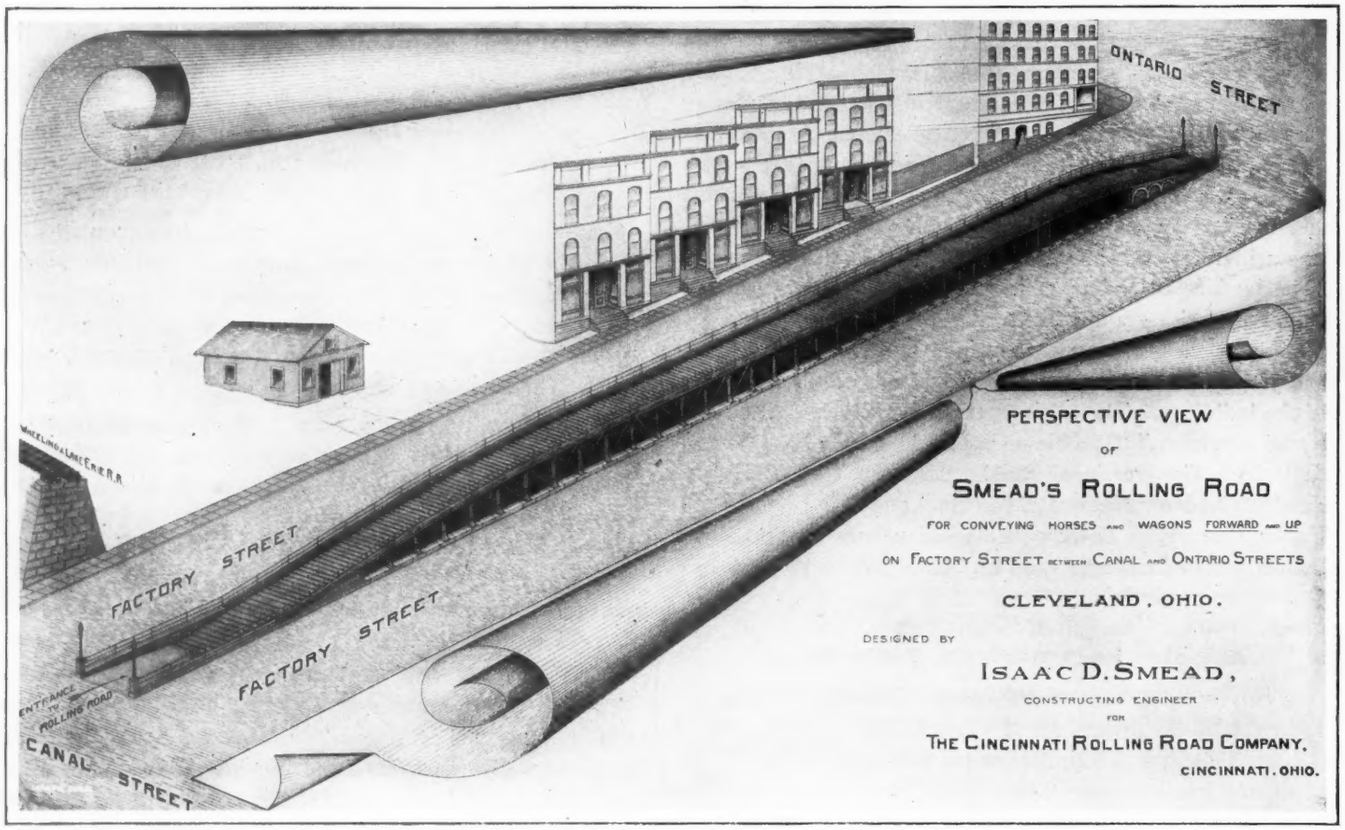
No better site could have been found in the "Forest City" to demonstrate the practicability of a rolling road. Factory street is the natural outlet for the vast shipping interests of the lowlands. It has been impossible, hitherto, to use this street, or hill, for heavy trucking because of its steep, treacherous ascent of some seventy odd feet. Teams have been obliged to make a long detour instead of using this natural short cut from the lowlands to the city's level, thereby losing a vast amount of time to say nothing of the wear and tear on horses, harness and wagons.

business houses, which was presented to the Council. An ordinance was granted without delay.

The Cleveland rolling road is an ornamental as well as a useful structure. It is twelve feet wide, beginning at a point about ten feet east of the east side of Canal street and extending thence easterly a distance of four hundred and twenty feet, with an elevation of sixty-five feet to Ontario street. The teams are advanced upward and onward at the rate of six miles an hour.

The vital principles embodied in this labor-saving device embrace not only economy of time and expense, but the exercise of humanity toward horses that would otherwise be overworked. The business end of the new enterprise reveals itself in the following reasonable schedule of tolls which are charged for the use of the rolling road:

1 Horse, buggy and driver	10c.
1 Horse, barouche and 2 persons	15c.
2 Horses, carriage and driver	20c.



One of the most prominent lumber dealers of Cleveland voices the opinion of the majority of shippers when he states that he regards the innovation of the rolling road as "a genuine boon to the business men of the city." Formerly his teams had to make a wide detour around Factory street, which meant in each case a loss of an hour or more. He welcomes, most cordially, the opportunity of paying toll to the rolling road company which carries each team up the steep ascent in one and one-half minutes. Besides the saving in time and wear and tear on his horses, wagons and harness, he is enabled to largely increase the load on each wagon.

For years, Col. Smead has been of the opinion that a better method of getting merchandise and wagons from lower to higher levels could be devised, than the ones now in use, notably in Cincinnati and Pittsburg. To this end he designed and patented the necessary plans and machinery and secured the needed State legislation at the last assembly of the Ohio Legislature. It was through this activity at Ohio's capital that citizens of Cleveland invited Col. Smead to install a rolling road in the interest of the shippers on the flats. A petition for the device was formerly drawn up by one hundred large

Hack and driver	20c.
1 Horse, spring-wagon and driver	15c.
2 Horses, spring-wagon and driver	20c.
2 Horses, loaded wagon and driver	25c.
3 Horses, loaded wagon and driver	30c.
4 Horses, ordinary loaded wagon and driver	40c.
4 Horses, extraordinary loaded wagon and driver	50c.
Each individual other than driver	2c.
Each foot passenger	2c.

—THE New York *Sun* of September 4, 1904, had this to say about the Studebakers: "How rarely now one sees a foreign name plate on a carriage in New York. How often a few years ago? There is no question but that Studebaker did most to make American carriages better than those of Europe—better in character and style of design—better in workmanship. In fact, Studebaker has built the spirit of sturdy and progressive Americanism into the vehicle itself."

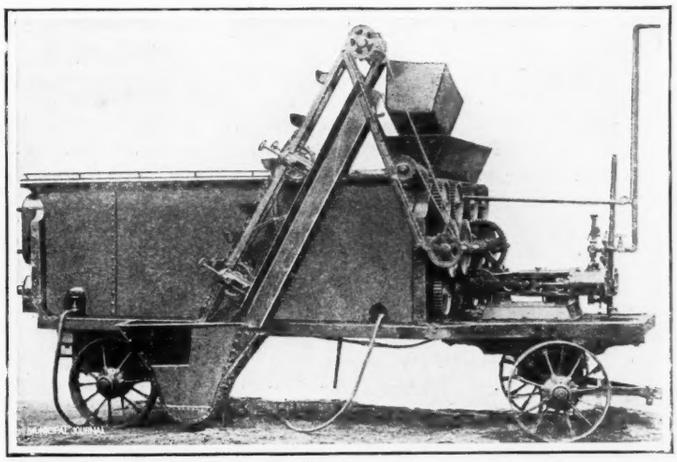
Kentucky Rock Asphalt

"NATURAL Rock Asphalt for pavements is forging to the front," recently said a well-known engineer. "The disquieting questions recently raised as to the value of different bitumens in sheet asphalt pavements and the undoubted fact that the contractors for the "Composition," or what are called in Europe "Pitch" composition pavements, have failed to keep their streets in good repair, has caused a renewed interest to be shown in the bituminous limestone, the original material used for asphalt paving in Europe and to the very similar material—Kentucky Rock Asphalt—such as that mined in Edmonson County, Kentucky, at Pittsburg Landing on the Green River.

"The return to the use of rock asphalt for streets is to be expected now that the right quality of rock and the proper machine for heating same have both been found in the United States.

"To return to the original and only really satisfactory method of laying asphalt streets, therefore, we must again use natural rock asphalt and now our municipalities can do so with economy.

"By the use of the natural rock asphalt, mined by the Wadsworth Stone & Paving Co., and through the heating of the powder by the Company's heater a pavement can be obtained which is superior to even the European rock asphalt pavements which have but one fault



MACHINE FOR HEATING ROCK ASPHALT MADE BY WADSWORTH STONE & PAVING COMPANY, PITTSBURG, PA.

—slipperiness. This trouble is overcome in the Kentucky rock asphalt, which, having a silica base, does not take a polish like the bituminous limestones of Europe and while affording a noiseless, sanitary, level and durable pavement also allows a foothold for horses.

"The Kentucky rock asphalt does not come before the public as a new material, for it has been extensively used in the cities of New York, Buffalo and Louisville, and carries with it all the best attributes of the European rock which has been so extensively used in New York, Boston, Philadelphia, New Haven, New Orleans and other Atlantic port cities where low ocean freights on the material have allowed of its use.

It is claimed by the Wadsworth Stone & Paving Co. that its rock has every good point found in the European material, with the most important addition of the absence of a polished surface after wear of traffic. That the use of Kentucky rock asphalt has not been uniformly a success is owing to the fact that its natural advantages and special good qualities have not been properly utilized. Up to the present time the people interested in other Kentucky deposits have been unable to properly manipulate this natural rock asphalt on account of a light oil (petrolene) which always impregnated the bitumen to such an extent that it was impossible to get rid of it by any ordinary system of heating, and the existence of this oil resulted in too soft a pavement. To overcome this condition the mixing of German rock, Cuban or Venezuela asphalt in some cases, or the addition of carbonate of lime in others, was resorted to, but all proved unsatisfactory. To obviate this trouble, Mr. W. C. Thoma, secretary and treasurer of the Wadsworth Stone & Paving Co., acquired the invention of a heating machine, shown in accompanying illustration, to remove the light oils to such an extent that only so much as is necessary to keep alive forever the natural bitumen which the rock contains is allowed to remain. By the use of this heater, where the work is done through steam jacketed cylinders, many mistakes are prevented, such, for instance, as have occurred because the rock powder has not been sufficiently heated, or heated by direct means which burns a portion and leaves the remainder unevenly heated.

This Company claims that no so-called experts are required to properly cook and mix the asphalt powder as it is mixed by nature, and the machine does the rest. There are two sizes of machines. The one shown in cut is the large size and will lay about 800 square yards of two-inch pavement in ten hours. The other is just one-half the capacity, and is the one recommended to cities for repairs. The machines are portable and any traction engine of sufficient size can be used to move the plant and also furnish the power and heat to operate it. This machine can also be used as a stationary plant, by connecting same with any ordinary boiler which is allowed to carry 100 pounds steam pressure. These machines are the most inexpensive ever put on the market, and the material being already prepared for use, makes this system the most desirable.

This Company claims that a city can well afford to do its own repair work, thus saving from 50 to 75 per cent. of the present cost of asphalt street repairs. Municipalities may not yet be prepared to do their own new street work, but there are certainly responsible and competent contractors in each city in whom the authorities and public have confidence, who might desire to enter this branch of the contracting business when convinced that their work would be satisfactory to the city officials and return them a handsome income for their investment and time, and still furnish better streets than have heretofore been the rule at no greater cost, or equally good at a less cost.

The exploitation of the Pittsburg Landing deposit of Kentucky asphalt is due to Mr. W. C. Thoma, who three years ago, while seeking for a rock asphalt to take the place of Seyssel rock, came across this deposit, and it is through his assiduous care and tireless energy that the possibilities of this material have been brought to perfection.

The rock itself runs very evenly in texture and contains, as mined, 7 per cent. to 10 per cent. of the purest bitumen nature ever produced, and when shipped in powdered form it is ready for heating and laying. Nothing whatever is added to the powder and the resulting pavement is all that can be desired. The manufacture of mastic at the mines is a most important branch of the business and has been brought to the highest scientific perfection through the careful investigation of the exactly right sort of bitumen to add to the powdered rock when reducing it to the fluid or mastic form. In this mastic is found nothing but pure materials; viz.: silica, carbonate lime and bitumen, free from residuum oils or earthen or vegetable matter which no imported mastic can claim. During this year shipments of it have been made to twenty-two different cities in the United States and also to Canada.

Awards to the Westinghouse Companies

THE prizes awarded to the Westinghouse Companies at the Louisiana Purchase Exposition is probably the longest and most comprehensive list of highest honors ever received by associated interests at a world's fair. The awards made by the International Jury, which embraced a special award in the Department of Machinery for "the best, most complete and most attractive installation," are as follows:

Twelve grand prizes to the Westinghouse Electric and Manufacturing Company for "Alternating current generators and motors, alternating current turbo-generator installation static transformers, and rotary converters"; for "Direct current generators and motors"; for "Electric railway motors, alternating current and direct current, and control systems for single and multiple unit operation and for mining and industrial locomotives"; for "Horizontal gas en-

gines and steam turbines"; for "Air brakes and friction draft gears"; for "Brakes for electric cars"; for "Driver brakes"; for "Air and steam couplers"; for "Air brakes and accessories"; for "Air brakes and accessories"; for "Signal system"; for "The development of the mercury vapor arc lamp."

Eight gold medals to the Westinghouse Electric and Manufacturing Company, for "Complete switchboards and controlling apparatus, and the application of electric motors for mechanical purposes"; for "Alternating current, direct current, and Bremer arc lamps and arc lighting systems"; for "Electric measuring instruments"; for "Nernst lamps"; for "Vapor lamps for photo-engraving"; for "Water and gas meters"; for "Industrial betterment work"; for "The housing of the working classes."

Four silver medals to the Westingnouse Electric and Manufacturing Company, for "Switches, fuses and wiring appliances"; for "Incandescent lamps"; for "Electric light fittings"; for "Gasolene automobiles."

One bronze medal for "Electric switches."

Coal Production and Kindred Industries

The Pittsburg-Buffalo Company, an incorporation of great industries known in coal circles as the *"Jones interests,"* miners, manufacturers and shippers of coal, coke, brick, sewer-pipe, etc., publish a handsome brochure which contains some interesting and valuable statistics of coal production for the past ninety years, and a short history of the company's experience in its chosen line of business, with cuts, descriptions of offices, mines and works of the company, together with some biographical sketches of the active heads of departments.

An ingenious calculator informs us that the coal output of the United States for 1903 was 354,037,380 tons, forming a train that would extend four times around the world and on returning reach from Pittsburg to Buffalo.

To deal adequately and fairly with the bituminous coal trade of the United States, especially of Pennsylvania, in the cold, prosaic figures of record, which are of such wonderful magnitude, one must accustom himself to the use of extravagant phrases and hyperbolic figures of speech; common adjectives and ordinary terms will not do justice to, nor properly convey to the mind, the enormous tonnage that coal mining and shipping has reached in the past few years. When figures thus rise into millions, they become too vast to be readily comprehended by the minds of men. Compute the output of the United States for 1903 at say $1.10 a ton at the mine, and freight at $1.10 per ton for the average haul, and the result is the astounding sum of $778,882,236. Estimating the average freight car at 20 tons, to move this tonnage would require 17,701,869 cars, which at an average length of 30 feet would form a train of cars 100,578 4-5 miles in length, that would reach four times around the world, and moving at the rate of 15 miles per hour would take to pass a given point 6,705 1-5 hours, or about nine and one-half months. Such statistics demonstrate that the history of mining and shipping of coal has reached a point where the vividness of the reality of to-day surpasses all the imaginings of the past.

New Record for the "Central"

Uncle Sam's mail was brought into this city in record time on October 13th last over the New York Central & Hudson River Railroad, when the mail train, consisting of six cars, made the distance between Albany and the Grand Central Depot, 143 miles, in 142 minutes.

The train is technically known as No. 32, and makes no stops between Albany and New York, although it must be remembered that there is a slowing down at various points to take on mail from the swinging cranes holding the bags. The train, which was in charge of Engineer R. Butterfield and drawn by Engine No. 2,998, left Albany one hour and ten minutes late. When it rolled into the Grand Central Station two hours and twenty-two minutes later it had made up all of this time except seven minutes. In this regard all the records of the road are beaten.

The Empire State Express, which makes regularly the best run on the road, carries usually four cars, sometimes five. Car for car those on the Empire State are heavier than the mail cars, but the mail train was composed of six cars, all heavily laden, and, taking these facts into consideration, the officers of the road said yesterday that a new record had been made.—*From the New York Times.*

The Studebaker Prizes

The Studebaker Bros. Manufacturing Co., the great wagon makers of America, has received the Double Grand Prize, which is the highest award given by the Louisiana Purchase Exposition. The list included in the award follows:

One-horse wagons for farm and city use. Two-horse wagons for farm and city use. Mountain wagons with wood axles and steel skeins. California wagons with steel axles.

City lumber gears with wood axles and steel skeins. Logging truck. Logging cart wheel. Wagon for cotton States. Wagon for herder's use with camp equipment. Display farm wagon. Miniature farm wagon.

Cart for farm use. Hand push cart. Contractor's dump cart. Push carts; working exhibit on the grounds and in buildings.

Street cleaning carts; working exhibit on the ground and in buildings.

Hoosier dump wagon with wood axles and steel skeins for general contractors' use.

Banner dump wagon with steel axles for contractors' use, being especially adapted to heavy city work.

Two-horse street sweepers; working exhibit on the grounds.

Two-horse sprinkling wagons; two varieties of sprinkling attachments, viz., vertical and Niagara, constructed so as to accomplish the greatest amount of work with least quantity of water; working exhibit on the grounds.

Hand cart sprinklers for use in buildings, on lawns, walks, etc.; working exhibit on the grounds and in buildings.

Oil sprinkling wagon for oiling highways, etc. This wagon is in the Mines and Metallurgy Building.

Light and heavy fine carriages, viz., park phaeton, brougham, cabriolet, victoria, station wagon, trap, mail phaeton, opera bus, rockaway, extension top carriages, etc.; also buggies, surreys, runabouts, driving wagons, traps, wagonettes, etc.; also spring wagons for passenger use; also spring wagons for business use, open and with top, fancy parcel wagons with top and panel sides, ice wagons, coal wagons, spring trucks—working exhibit on the grounds—rural mail wagons, rural mail outfit complete, viz., wagon, harness and horse.

Single buggy harness. Single road harness. Single track harness. Single pony harness. Single surrey harness. Single Goddard harness. Single brougham harness. Single gig harness. Single express harness. Single delivery harness. Single handsome cab harness. Four-in-hand harness. Tandem harness.

Double spring wagon harness. Double farm wagon harness. Double team harness. Double truck harness. Double carriage harness. Double pole road harness. Double wet weather harness. Double driving harness. Double trap harness.

Display of accessories, viz., blankets, whips, robes, bridles, saddles, crops, spurs, bits, canes, coachman's outfits, stable equipment, etc., domestic and imported.

Second Largest Water Power Equipment

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has been awarded by the board of trustees of the sanitary district of Chicago the contract for the turbine water wheel equipment for the new power house of the Chicago drainage canal.

It is said that the company was awarded the contract strictly on the excellence of its design, and has as competitors the most noted European and American builders of water wheels.

This is the second largest installation of water power equipment contracted for in the United States, the largest single water power equipment previously contracted for being the one also built by the Wellman-Seaver-Morgan Company at Sault Ste. Marie, Michigan, for the mammoth power house of the Michigan Lake Superior

Power Company, and to consist when completed of 50,000 horse power.

The Chicago Drainage Canal power station, which is to be located near Joliet, will be the most complete and up-to-date plant in the United States, and a model of its kind in every detail. The equipment will comprise four 6,000 horse power units of turbine wheels, which will be direct connected to electric generators. There are also two exciter units of 600 horse power each included in the contract.

The contract will require about one year for completion.

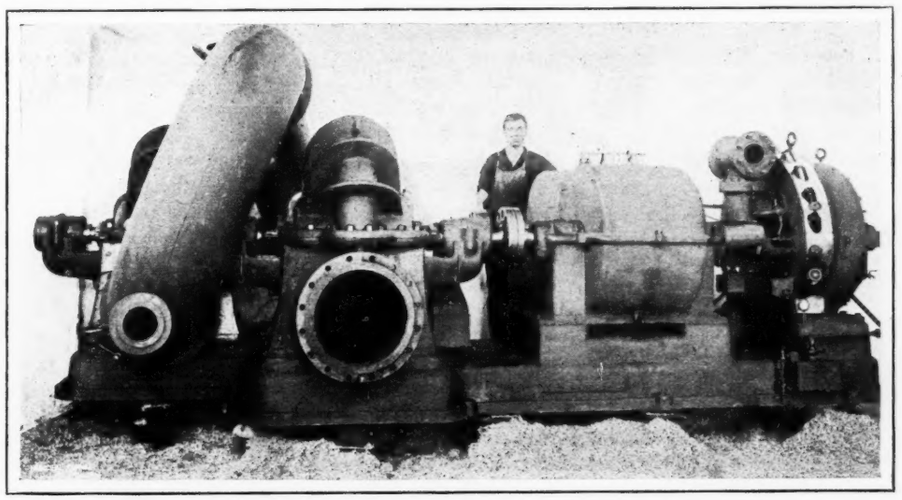
300-Horse Power Steam Turbine Pump

THE capacity of the Mt. Prospect pumping station, of Brooklyn, N. Y., has recently been increased by the installation of a 300 h.-p. steam turbine, direct connected to two DeLaval centrifugal pumps, made by the DeLaval Steam Turbine Company, of New York and Trenton, N. J.

This pump has a total capacity of 4,200 gallons per minute against a total head of 175 feet, with the pump wheels running at 900 revolutions per minute, and a steam pressure of 150 pounds and vacuum of 27-1/16".

As a description of this pump will interest many of the readers of THE MUNICIPAL JOURNAL, it is given in the words of the makers:

"The diameter of the pump runners is 22-1/16" outside. It is not provided with stationary guide, or diffusion vanes outside of the pump wheel, as we do not believe in same. The ribs on the pump



300-HORSE POWER DE LAVAL STEAM TURBINE PUMP

case are provided for strengthening it, in order to take care of the high pressure.

"When cold water is to be handled the pump is provided with leather, cupped packing rings which are set out by the water pressure. This insures a very tight packing, both against the leakage of water and the suction of air around the shaft. By providing separate bearings and this style of packing the lubricant cannot enter the pump chamber. This is a very important matter where liquids are to be handled, which would be damaged by coming in contact with oil.

"When hot water is to be handled graphite flax packing is used instead of the leather packing rings.

"The shaft is made of best steel and is provided with brass protecting sleeves at the packings and extended so as to prevent the steel shaft coming in contact with the liquid to be pumped.

"The runners are usually made of bronze, and where acid water is to be handled, are made of acid resisting metal.

"A special drip chamber is provided, which catches any leakage from the pump case, and prevents the fluid entering the bearings and mixing with the oil.

"The smaller units usually consist in one centrifugal pump, driven by a single geared steam turbine. The larger units consist of two centrifugal pumps driven by one double-geared turbine, one pump being connected to each gear shaft, thus permitting their operation to be in parallel for low pressure, or in series when high lifts are desired."

All of the pumps made by this concern are tested in every particular, a full description of which is given in "Bulletin No. 9," published by the DeLaval Steam Turbine Company, which can be had for the asking. Address the Company either at Trenton, N. J., or 74 Cortlandt street, New York.

Wanted: Chemical Extinguishers That Are Safe

THE attention of the MUNICIPAL JOURNAL has been called to the frequency with which chemical extinguishers explode, especially of the hand type, thus endangering human life. If this were a necessary evil it might be excused, but as in nearly every instance the explosion is caused by faulty methods of construction rather than careless handling by the fireman, and, as there is a remedy for the evil, viz., the condemnation and exclusion of all cheaply constructed machines, and the use of only such as are made by reliable concerns, there is no good reason why the municipal authorities and the public generally should not insist on the use of the machine that won't explode.

Not long ago one of these imperfectly manufactured machines exploded when about to be used by the Chief of the Tallahassee Fire Department. When the Chief was asked to give an account of the explosion he said:

"It is my desire not to do any one an injustice in this matter, but the manufacturers were advised that the machine apparently exploded from the cause of poor construction, and they were asked to give us such information as would exonerate them, but this they have not done and have put forth very little effort in that direction. The extinguisher that gave the trouble was of the kind that is made to sell at a low price without regard to possible consequences and was being used by the writer, was in good condition in every way; the charge was correct and the temperature of contents was normal. The only defect to be found was in the fact that the outlet was stopped by corrosion and kinking of hose. The extinguisher was inverted as usual and charge broken when the top, which was downward, was blown out and the cylinder thrown vertically many feet. The operator having hold of the handle in bottom received the force of the ascending cylinder on the arm and shoulder, which knocked him down and rendered him unconscious, leaving a badly strained and bruised hand, arm and shoulder, and from which he has not yet entirely recovered.

"It is my opinion that if the dropping of a machine, the overcharging of water, the stoppage of outlet, or any other condition, so likely to occur at any time with the general unsuspecting public, are causes for serious explosions, why, then, it is time that the matter was investigated and some steps taken for the protection of the many thousands who handle an extinguisher with the same feeling of safety as they would have with a bucket of water."

There are several concerns which manufacture chemical extinguishers which are of the desired quality and which have never been known to explode under any circumstances. "An ounce of prevention is worth a pound of cure," and if fire commissioners, fire chiefs, or any other city officials, wish to be put in touch with those makers who produce extinguishers that are safe, the MUNICIPAL JOURNAL will be glad to supply the names and addresses.

"There are several extinguishers on the market that are made for parties who are not manufacturers, who have no facilities for testing machines turned over to them at a price. These machines are never tested, are made of copper sheets unequal to a strain of more than two or three hundred pounds when new. After one or two

years of use under chemical action they become veritable dynamite bombs. Purchasers of extinguishers should avoid these and buy only of bona fide manufacturers and require them to certify to the pressure they will stand," says a fire chief who speaks from experience.

Trade Publications Received

—In a twenty-page booklet, with cover, W. H. Anderson & Sons give a brief but interesting and illustrated description of the automobile and gas engine forgings, manufactured by them.

—City officials interested in artificial stone will be glad to have on file a booklet recently issued under the subject of "Cement Buildings," by the American Hydraulic Stone Company, Century Building, Denver, Col.

—"Illustrated Pamphlet of Steam Pumps" is the title of a fifty-two-page booklet, with cover, illustrated and beautifully printed, recently issued by A. S. Cameron Steam Pump Works, East Twenty-third street, New York City.

—The subscription price of the *Four Track News,* beginning with January 1st, 1905, will be raised from 50c. to $1.00. Subscriptions received prior to that date for the year 1905 only, will be accepted at the old rate of 50c. a year.

—In Catalogue No. 171, of twenty-four pages, well illustrated, The American Blower Company, Detroit, Mich., tells about "A. B. C. Vertical Engines, Type A," as a new and effective system of automatic lubrication for vertical high speed engines.

—The Wellman-Seaver-Morgan Company, engineers and manufacturers, with general offices in Cleveland and works at Cleveland and Akron, Ohio, in a beautifully printed twelve-page catalogue, folio size, describe and illustrate the Cockerill Gas engine.

—The Municipal Journal is indebted to the Pittsburg Meter Company, East Pittsburg, Pa., for a copy of a beautiful brochure telling about the Westinghouse industries. It is profusely illustrated, and has an exquisite cover done in colors, with a partial view of the World's Fair.

—The Humphrey Foundry Company, Bellefontaine, O., manufacturers cast iron culvert and sewer pipe, street and road supplies and general castings. The company has recently issued a 16-page catalogue with cover, which tells all about its products and gives illustrations of most of them.

—The Ingersoll-Sargeant Drill Company, New York City, tells an interesting story about its work in connection with the New York Subway in a thirty-two-page booklet, with cover. The title of the booklet, which is embossed in vermillion on the cover, is "Driving the New York Subway."

Items of Interest About the Trade

—The Roessler & Hasslocher Chemical Company, 100 William street, New York City, has been awarded the Grand Prize by the Louisiana Purchase Exposition.

—The Mietz & Weiss Oil and Gas Engines were awarded a Gold Medal and Special Diploma by the superior jury of the Louisiana Purchase Exposition. The Meitz & Weiss engines were exhibited in action in the Machinery Building.

—The Continental Railway Equipment Company, 42 Broadway, New York, reports a gratifying increase in business for October. Contractors and others will be interested in their monthly list of bargains in new and second-hand road rollers, steam shovels, locomotives, hoisting engines and railway and contractors' equipment of every description.

—The Davison Foundry Company, 103 West Monroe street, Chicago, has recently increased the capacity of its plant so that now it has unexcelled facilities for handling all kinds of street work supplies. It would take a large sized booklet to even briefly describe half the products of this concern, but much is told in a booklet recently published, which can be had for the asking.

—The City Council of Atlantic City, N. J., by special resolution, has specified that the steel protected concrete curb, manufactured by the Steel Protected Concrete Company, Philadelphia, shall be used on Atlantic avenue, which is being paved a distance of 3½ miles, thus making seven miles of this most excellent curb. This is a wise resolution, and one that we hope to see extensively followed.

—C. W. Hunt Company, of West New Brighton, New York, has been particularly successful at the World's Fair, two of their three exhibits securing highest awards, the third not entered. The Hunt "Industrial" Railway received the gold medal for narrow-gauge railways, and the electric storage battery locomotive, built by that company, received the silver medal, being the highest award for this type of locomotive.

—Contracts have been signed between the Butler Plank Road Company and the Steel Highway Track Construction Company of America, whose principal office is in Philadelphia, which call for the laying of a steel track on the plank road maintained by the former. The track will be built out of Etna, in Allegheny County, Pa., and is the first of that kind to be laid in that county. The contract price for the experimental mile is $6,000, and Mr. T. H. Gibbons, Superintendent of the Company, is now on the ground superintending the work. It is said that if successful the Butler Plank Road Company will double track their road from Etna, where the trolley line ends, to Butler, a distance of forty miles. Tests which have been made of this system insure a successful outcome of the first experiment. The Butler Plank Road Company has maintained a plank road through Allegheny County for a great many years, and is a very wealthy corporation. This road is the main highway in this part of the country and is traveled over by hundreds of thousands in the course of a year. A large amount is expended every year for repairing the road in its present form, and the directors of the road correctly argue that a permanent road such as the system owned by the Steel Highway Track Construction Company would be an immense saving in the course of a few years. Everyone at all interested in the subject of good roads will watch with the keenest interest the result of this step.

War on the Ticket Scalpers

Judge Grosscup, of the United States Circuit Court, has just issued an order restraining nineteen Chicago ticket scalpers from dealing in any railroad tickets or the unused portions thereof which are not transferable. If this order is made permanent it will practically put the ticket dealers out of business. The City Council of Nashville, Tenn., has also recently adopted an ordinance defining the business known as that of ticket broker or dealer. In that city Moses Henlin, who conducted a ticket brokerage office, was indicted a short time ago by the Grand Jury of Davidson County for uttering forged or altered tickets or passes. He pleaded guilty and was sentenced to fifteen days in the workhouse and pay a fine of $500.—*From the Brooklyn Standard Union.*

* * * In the year 1892 the total expenditure on public works in New Zealand was $1,958,060. Last year it was $8,101,885, the expenditure for railway construction alone, including additions to open lines, being $4,143,515, or more than double the total during the year 1892, and that on roads ($1,805,220) being greater than the total for the year 1890-91, which was $1,675,755.

* * * As a result of the introduction of the new system of investigation which has been made to apply to all old age pensioners already on the books, in the colony of New Zealand in addition to new claimants, there has been a decided drop in the number of new pensions granted. The actual amount paid in pensions during the year was $1,015,820, or $34,880 less than last year. The treasurer thinks the present system results in greater care being exercised in granting pensions, and that it has reduced fraud to a minimum.

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Akron, O.—Will pave Spicer street with brick.

Alton, Ill.—Will pave Fourth, Belle, State and other streets with brick.

Baltimore, Md.—Commissioner of Highways has approved nearly $800,000 paving ordinances. Clifton avenue and Fayette and Patuxent streets will be paved and cost of widening Charles street will be $325,000. After January 1, 1905, $12,680.88 will be spent opening new streets; $10,800, paving Hoffman street; $94,500, paving North avenue; $30,000 for St. Paul street boulevard; $50,000 repaving High, Ensor, Orleans, Gilmore streets and Harlem avenue; $12,688.88, opening Race street; $435,000 for improvements to Central market space; $100,000 for general work. B. F. Fendall, City Engineer.

Binghamton, N. Y.—Bids will be wanted soon for asphalt paving to be done next year.

Birmingham, Ala.—Highland avenue will be paved with creosoted wood block and Eighteenth street and Morris avenue with vitrified block.

Buffalo, N. Y.—The appropriation for repaving Clinton, Dodge, Fenn, Bond, Michigan, Krettner, Sixteenth and Seventeenth streets from $15,500 to $27,514.

Cincinnati, O.—Zeltner street will be paved with brick and Vernon street will be macadamized and flagged. Beekman street will be paved with granite block. Vine street reported to be paved with granite estimated to cost $40,707.

Cleveland, O.—Considering paving Otaker, Fin, Nursery and Quincy streets with brick and Muirson street with Medina stone.

Connersville, Ind.—$13,230 street improvement bonds will be issued.

East Lake, Ala.—$12,500 will be issued for street improvements.

Erie, Pa.—Will pave Fourteenth, Seventeenth streets and repave Sixth street. May pave Ninth street.

Escanaba, Mich.—Ludington street will be paved in the spring with vitrified brick.

Indianapolis, Ind.—Cement walks will be laid on Eighteenth, Cedar and Becker streets.

Jacksonville, Fla.—$34,446 will be spent on paving and $49,000 on repairs and maintenance of streets.

Jersey City, N. J.—Bids wanted soon for paving McAdoo avenue with granite block.

Kansas City, Mo.—Will pave Westport avenue, Warwick boulevard, McGee, Bellefontaine avenue, Twenty-fourth, Forty-third, Myrtle, Charlotte streets, Southwest boulevard and several alleys. Will repair paving on Genesee street. Will lay granitoid walks on Thirty-eighth, Woodland, Tenth, Twenty-fourth, Roberts, Twentieth, Eighth, Shaefer, Twenty-first, Westport, Thirty-fourth, Ninth and Fifteenth streets and Terrace place.

Kearney, N. J.—Considering improving Linden, Grand avenues, Brick, Chestnut streets and Morgan place.

Kittanning, Pa.—Several streets will be paved with brick.

Lakewood, O.—$54,260.16 street improvement bonds will be sold.

Landmark, Va.—Ordinance passed on first reading for Sixth Ward boulevard, estimated at $38,278.

Lawrence, Mass.—$50,000 will be spent, next spring, in laying a new style of wooden paving on bridges.

Lawrence, N. Y.—$10,000 bonds for paving and grading have been voted recently.

McKeesport, Pa.—Bids wanted in December for paving Eighteenth street. Will open Tenth and Spring streets and may widen Walnut street.

Milwaukee, Wis.—City Engineer has estimated that the necessary street improvements for the next three years will be $200,000 per year.

Nashville, Tenn.—Budget for next year includes $91,230 for street department, an increase of $21,230 over last year.

New Bedford, Mass.—Considering appropriating $25,000 for street purposes.

New York City, N. Y.—The estimated cost of widening and improving Cathedral parkway will be $73,000.

Norfolk, Va.—Considering repaving Main street, probably with asphalt.

Oakland, Cal.—Have appropriated $15,000 for completing Harrison street boulevard.

Parkersburg, W. Va.—Will pave 12 blocks of streets with brick.

Peoria, Ill.—Bids wanted next spring for a considerable amount of paving.

Philadelphia, Pa.—Board of Surveyors have approved plans for parkway extensions to the amount of $2,000,000. Common Council has approved plans for $75,000 to be spent on completing speedway.

Pittsburg, Pa.—Carnegie street will be paved at a cost of $3,500 and Augusta street will be opened.

Rankin, Pa.—Voted on November 8, to issue $20,000 bonds for street improvements.

Rome, N. Y.—Will sell $20,000 paving bonds.

St. Louis, Mo.—Considering voting on the issuance of $9,000,000 city improvement bonds at election to be held next spring. Will pave Green Lea place, Virginia, Bartmer, Burd, Evans and Michigan avenues with asphalt, and Shaw avenue, Lucky and Potomac streets with vitrified brick.

Salt Lake City, Utah.—Plans have been prepared to lay from $15,000 to $20,000 crosswalks.

San Francisco, Cal.—Will pave Fourth street with basalt blocks on a six-inch concrete base, estimated at $17,500.

Seattle, Wash.—Eighth avenue and an alley will be paved with asphalt at a cost of $5,170. Considering paving Eighteenth avenue with asphalt at an estimated cost of $210,000.

Springfield, Ill.—Fourth street will be paved with asphalt.

Steubenville, O.—Brick pavement will be laid on Sixth, Seventh and Benton streets.

Syracuse, N. Y.—Bids wanted for paving Mark street with sheet or block asphalt or vitrified brick or block.

Tacoma, Wash.—North "K" street will be asphalted for one mile. Considering several miles of asphalt pavement next year.

Tampa, Ga.—Reported to have recently voted $300,000 bonds for paving and sewerage.

Toledo, O.—Spielbusch avenue will be paved with either vitrified paving block, asphalt block, sheet asphalt, Medina block or creosoted wood block on concrete, vitrified block or asphalt block. Monroe street will be paved also. Considering issuing $210,000 street improvement bonds.

Toronto, Ont., Can.—County will issue $125,000 bonds for road improvements. City Engineer recommends asphalt pavement laid on Bank, George, Frederick and Dundonald streets.

Vailsburg, N. J.—Considering spending $70,000 on street improvements.

Washington, D. C.—Pennsylvania avenue will be resurfaced at an expense of $300,000. Commissioners want $500,000 to be spent on eliminating grade crossings next year.

Waterbury, Conn.—May issue $200,000 bonds for paving.

West Hoboken, N. J.—Summit avenue will be paved with Belgian block. May pave Hill street with brick.

Wilkesbarre, Pa.—Bonds will be issued for street improvements.

CONTRACTS AWARDED

Ashville, N. C.—Warren Brothers Company, 93 Federal street, Boston, are now at work on 37,000 square yards of bitulithic pavement on Lexington street, French Broad and Cumberland avenues. Recently the Warren company was awarded the additional contract for 3,000 square yards of bitulithic to be laid on North French Broad avenue. In addition to the above contracts, the city has in use about two miles of the bitulithic, laid in 1903.

Boston, Mass.—Contract, for resurfacing Revere Beach reservation and Lynnway, to E. W. Everson and Company, at $117,063.

Chicago, Ill.—Contracts for paving, to Barber Asphalt Paving Company: Emerald avenue, asphalt at $2.27 per square yard, total $21,000; Irving avenue, asphalt at $2.15 per square yard, total $15,969; North Hermitage avenue, asphalt at $2.17 per square yard, total $27,191; Fulton street, asphalt at $2.29 per square yard, total $32,000. Contracts to R. T. Conway Company, 138 Washington street: West Eighty-seventh street, macadam at $1.15 per square yard, total $28,000; Forty-eighth avenue, asphalt at $2.40 per square yard, total $15,000. To Farr Brothers and Company, One-hundred and twelfth street to be paved with macadam, was awarded, at $93,466.

Cincinnati, O.—Reported that contract for brick paving on Sixth street, was awarded to F. H. Kirchner, Temple Court, at $13,957.

Creston, Iowa.—Contract for paving to King and Company, Des Moines: 5,000 square feet, vitrified brick, at $.26 per square foot; 5,000 cubic yards of excavation, at $.115 per cubic yard; 1,006 lineal feet of cement curb, at $.455 per lineal foot. Contract for brick reported to be let to Flint Brick Company, at about $10,000.

Dayton, O.—Contract for paving North Main street, to Jas. C. Conley, at $17,473.

Greensburg, Pa.—Contract for four miles macadam road in Westmoreland county, to P. F. McCann, city, at $31,000.

Lawrence, Kan.—Contract for paving and grading certain streets, to Hoskins and Ramsey, Topeka, at $15,000.

Lincoln, Ill.—Contract for paving Ninth street to J. E. Bretz, Springfield: 3,456 square yards Poston brick block at $1.88 per square yard; 2,592 feet, combined concrete curb and gutter, $.55 per foot; 1,944 cubic yards, excavations, at $.20 per cubic yard.

Mt. Vernon, Ill.—Contract for paving and grading Harrison street, to Grant and George C. Forbes, Terre Haute, Ind., at $11,336.

New York, N. Y.—Contract for grading Broadway from Spuyten Duyvil Creek to city line, to A. J. Collins, Fordham, N. Y., at $171,197. Contract for regulating, grading, curbing and laying walks on Coney Island avenue, Brooklyn, to Wilson, Baillie Manufacturing Company, 26 Court street, Brooklyn, at $36,104. Contracts awarded in Long Island City: Completing the asphalt pavement on Jamaica avenue, New York Bermudez Company, at $16,942; grading and laying crosswalks on Sixth avenue, John Horrie, at $14,775; asphalting on Marc place, Hastings Pavement Company, 25 Broad street, at $4,751.

Niagara Falls, N. Y.—Contract for paving South avenue, with asphalt, to Barber Asphalt Company, at $7,662.

Oklahoma City, O. T.—Contract for 20,000 yards of asphalt pavement, reported awarded to Cleveland Trinidad Paving Company at $60,000. $35,000 worth of contracts to be awarded.

Omaha, Neb.—Contract for repaving North Sixteenth street, to Barber Asphalt Company, at $45,793.

Parkersburg, W. Va.—Contract for paving several streets with brick, to Camden Clay Company, Spilman, W. Va., at $23,385.

Rochester, N. Y.—Contract for paving University avenue, with asphalt and Medina block, to Whitmore, Rauber and Vicinus, at $50,868.40.

St. Louis, Mo.—Contracts awarded: Paving four streets with brick, Frum and Colnon, Laclede building, at $30,000; one street, brick, to Skrainka Construction Company, Security building, at $10,000; one street, granite, to H. Ruecking and Company, Gasconade and Marine streets, at $6,000; two streets, macadam, Granite Bituminous Paving Company, at $60,000.

ENGINEERS, CONTRACTORS, Etc.

ENGAGED IN MUNICIPAL WORK

IOWA ENGINEERING COMPANY
CIVIL, HYDRAULIC AND SANITARY ENGINEERS
CHAS. P. CHASE, Pres. and Manager ARTHUR J. COX, Sec. and Treas.
410-411 Weston Block, CLINTON, IA.
SPECIALTIES: Water-Works, Sewerage and Sewage Disposal

Emil Kuichling, C. E.
CONSULTING ENGINEER
52 Broadway, NEW YORK
Member of Am. S. C. E.
Plans for Public Water Supplies, Steam and Hydraulic Powers and Electric Power Transmissions.

CITY-WASTES DISPOSAL CO.
156 Fifth Avenue
NEW YORK
(Organized from the Staff of the late Col. George E. Waring, Jr.)
Consulting and Contracting in Sewerage, Sewage Disposal, Garbage and Refuse Disposal and Street Cleaning.

WISE & WATSON
CIVIL AND CONSULTING ENGINEERS
Passaic National Bank Building
PASSAIC, N. J.
COLIN R. WISE, City Surveyor of Passaic, N. J.
ROBERT M. WATSON, Borough Engineer of Rutherford, N. J.

J. T. FANNING
CONSULTING ENGINEER
300 Hennepin Avenue
MINNEAPOLIS, MINN.
M. Am. Soc. C. E.
Plans for Public Water Supplies, Steam and Hydraulic Powers and Electric Power Transmissions.

If you do not find it in our advertising pages write us. Our Information Bureau is at your service. Municipal Journal and Engineer.

D. P. REGAN & MULOCK
Electrical Subway Contractors
4402 Chestnut St., Phila., Pa.
and Atlantic City, New Jersey
More than 14 Years' Experience Exclusively in this Line in Europe and America.

Rudolph Hering
AND
George W. Fuller
HYDRAULIC ENGINEERS AND SANITARY EXPERTS
170 Broadway, NEW YORK
Water Supply, Water Purification, Water-Power, Sewerage and Sewage Disposal. Examinations of Projects, Plans, Specifications and Estimates of Cost.
Construction Superintended

San Francisco, Cal.—Contract for repaving "H" street, to T. M. Yorke Company, at about $35,000.

Seattle, Wash.—Contracts for concrete walks as follows: Fourteenth avenue, to T. Ryan, at $7,560; Summit avenue, Holt and McGuire, at $4,635; Nineteenth avenue, L. H. Goerig, $4,554; Crocket street, Paul Wagner, $13,491; Sixth avenue, West, Sparger Concrete Company, $5,789.

Shreveport, La.—In addition to the 110,000 square yards of bitulithic pavement now under contract, the Nashville Roofing and Paving Company was recently awarded the contract for laying 28,654 square yards of bitulithic on Stoner, Murphy, Winston streets and Texas road. At the same time bids were received for 8,348 square yards of asphalt paving on Lacey and Jordan streets. The Barber Asphalt Paving Company, being the lowest bidder, received the contract; but the Council refused to allow the Barber company to use "Trinidad Lake" asphalt and required that "Bermudez" be used, on account of the inferiority of the Trinidad brand.

Sycamore, Ill.—Contract for paving De Kalb avenue, to Thomas J. Peter and Company, at $23,660.

Tarentum, Pa.—Contract for paving Second and Tenth avenues and Wood and Porter streets reported to have been awarded to Duster Construction Company, city, at $35,000.

SEWERS

Baltimore, Md.—Appropriations for sewers, next year, are as follows: Carroll park, $29,000; Monroe and Payson streets, $35,000; Peck's branch, $2,300; Ogier run, $15,000; Park avenue, $1,500; Mosher street, $1,800; Low street, $1,350.

Birmingham, Ala., (Woodlawn Station.)—Considering issuing $30,000 sewer bonds.

Boston, Mass.—Considering a $600,000 bond issue for the construction of sewer extensions.

Camden, N. J.—Sewer extensions will be laid on Arch, Mechanic, 3rd, 9th and 27th streets.

Cincinnati, O.—Sewer will be laid on Ravine street as follows: 1790 lineal feet of 12-inch pipe; 380, of 18-inch; 365, of 21-inch; 75 "Y" branches on 12-inch pipe; 20 "Y" branches on 18-inch pipe; 20 "Y" branches on 21-inch pipe; 11 Palmer inlets; 2 round manholes; 16 oval manholes. Sewer on Linwood avenue, as follows: 423 lineal feet of 3-foot brick sewer; 500, of 3½-foot; 760, of 4-foot; 1010, of 5-foot; 1352, of 6½-foot; 1060, of 7-foot; 450 feet of 12-inch pipe; 166, of 15-inch; 386, of 18-inch; 194, of 21-inch; 902, of 24-inch; etc.

Colusa, Cal.—Considering installing a sewer system estimated at $32,900.

Darlington, S. C.—Bids wanted before December 10 for the construction of a sewer system estimated at $30,000. Bonds reported sold.

Dayton, O.—$17,900 recently appropriated for sewers to be laid on Oak, Wyoming, Jersey streets and St. Joseph and Duncan avenues. Will also sewer Curtis and Gunckel avenues.

Denver, Col.—Sanitary storm sewer will be laid on Colfax avenue, estimated at $50,428.

Elberton, Ga.—Recently voted to issue $20,000 bonds for a sewer system.

Erie, Pa.—Sewer extensions will be laid on Nineteenth and Reed streets.

Fairhaven, Mass.—$5,000 have been appropriated for sewer to be laid on Oxford street, $5,000 more will be added later.

Fayetteville, Ark.—Estimated cost of proposed sewer system is $60,000.

Harrisburg, Pa.—May vote in February on issuing $100,000 bonds for sewer improvements. Plans are being prepared.

Holley Springs, Miss.—Bonds have been voted and engineer engaged to supervise the laying of proposed $19,000 sewer system.

Hood River, Ore.—Town will install a sewer system.

Jersey City, N. J.—Considering appropriating $14,000 for reconstruction of sewer at Boland street and Fairmount avenue.

Kenosha, Wis.—Plans have been prepared for 14,506 lineal feet on Garden and other streets, estimated at $18,162.

Lestershire, N. Y.—Estimate has been made of a three-mile sewer system to cost $36,693. Will vote on it next March.

Hudson Engineering & Contracting Co.
92 William Street
New York

Bacon Patent Simple and Compound Air Lift Systems

Water Works and Artesian Well Systems Designed and Installed.

JOHN W. ALVORD
CONSULTING ENGINEER
1207 Hartford Bldg., CHICAGO

MEM. AM. SOC. C. E.

Hydraulics and Sanitation Works. Water Supplies, Water Power, Sewerage, Sewage Disposal.

STEPHEN CHILD
LANDSCAPE ARCHITECT
AND
CONSULTING ENGINEER
Warren Building, 2a Park St.
BOSTON, MASS.

S. B. Massachusetts Institute of Technology, 1888.
Member American Society of Civil Engineers.

Telephone Connection
Correspondence Solicited.

O. H. SHEFFIELD & CO.
CIVIL ENGINEERS AND ARCHITECTS
518 Austell Building, ATLANTA, GA.

Railways
Water-Powers
Municipal Public Works
Bridges and Buildings

ELISHA GREGORY
CONTRACTOR FOR DRILLING ARTESIAN WELLS
123 Liberty Street, NEW YORK

Water Works, Filtration Systems
POWER PLANTS
Brossmann & King, *Engineers*
Lemcke Building, Indianapolis, Ind.

WILLIAM B. EWING
CIVIL AND CONSULTING ENGINEER
1003 Chamber of Commerce
CHICAGO, ILL.

MEM. AM. S. C. E. MEM. WEST. S. E.

For Hydraulic, Sanitary, and Municipal Works. Water Works, Sewerage Systems, Septic Tanks, Sewerage Purification, Water Power, Pavements, Bridges, Expert Concrete Construction, Expert Examinations and Reports.

W. H. SCHOTT
ENGINEER
Marquette Building
CHICAGO

Designer and Builder
CENTRAL STATION
HEATING, GAS,
ELECTRIC LIGHT
and POWER PLANTS
STREET RAILWAYS FINANCED AND BUILT COMPLETE

Contractors' Equipment Company
BETZ BUILDING,
PHILADELPHIA.

Steam Road Rollers, Road Machines, Crushers, Sprinkling, Sanding, Dump and Distributing Wagons, Road Making and Contractors' Plant of every description. Our list for the asking. Correspondence solicited.

Lexington, Ky.—Recently voted to issue $100,000 bonds for a sanitary sewer system.

Marion, S. C.—Will vote December 13 on a $25,000 bond issue for sewerage system.

Menasha, Wis.—Sewers will be extended this fall and next spring, estimated at $20,000.

Milledgeville, Ga.—Will vote on January 24, 1905, on $20,000 bond issue of construction of a sewer system.

Milwaukee, Wis.—City Engineer has estimated that the necessary sewer work within the next three years will be $600,000, or $200,000 per year. Wooden sewer on Fifteenth and North streets will be replaced by a brick one to cost $7,000.

New Albany, Ind.—Will readvertise for $185,000 sewer. Plans have been changed and all bids were rejected.

New Britain, Conn.—$100,000 bonds have been voted for the completion of sewer work.

New York, N. Y. (Brooklyn).—Bids wanted, December 7, for sewers on Quay, West, Ninety-first, Midwood, Maple, Jefferson streets, Nostrand, Fort Hamilton and Atlantic avenues: 3,050 lineal feet of 66-inch; 5,070, of 60-inch; 910, of 54-inch; 866, of 48-inch; 715, of 36-inch; 340, of 30-inch brick sewer; 620, of 24-inch; 1,530, of 18-inch; 625, of 15-inch; 5,745, of 12-inch vitrified stoneware pipe sewer; 500 lineal feet of 6-inch drain tile; 166 manholes; 56 sewer basins, 625 cubic yards of concrete, planking, masonry, etc.

Ottawa, Ill.—Bids wanted for nine blocks of sewers on Guion street, estimated at $12,000.

Oxford, Miss.—Sewer system will be extended to the extent of $5,000.

Palatka, Fla.—Engineer has been engaged to prepare plans for a sewer system.

Passaic, N. J.—Sewers will be laid on Linden and Water streets and Main and Barbour avenues.

Peoria, Ill.—It is reported that the following sewers will be built next spring: Sanger street, circular brick, $90,000; South street, district 1, circular brick and sewer pipe, $35,000; west section, from 8-inch to 6-foot circular brick, $325,000.

Philadelphia, Pa.—Plans approed, recently, for a $40,000 sewer on Magee street.

Pipestone, Minn.—Bonds will be issued for main sewer and septic tank.

Pittsburg, Pa.—Will lay 15-inch pipe sewers on Edith, Darrah, Sycamore and Vera streets and Orlena and Ballard alleys.

Puyallup, Wash.—Recently voted to construct a $27,000 sewer system.

St. Joseph, Mo.—Bids wanted for extending Blakesnake Creek and Sycamore street sewers, $50,000 and $18,000 respectively.

St. Louis, Mo.—May vote at spring election on a $9,000,000 bond issue for city improvements.

St. Paul, Minn.—Sewers will be extended on Fim, Grand and Lincoln streets and Summit avenue at an estimated cost of $14,401.

San Francisco, Cal.—Considering the issuance of $165,000 bonds for sewers.

Sayre, Pa.—Considering a $37,000 sewer to be built at once and will later complete it at an expense of from $93,000 to $120,000.

Tampa, Fla.—$300,000 bonds reported to have been voted recently, for sewerage and paving.

Toledo, O.—May issue $40,000 bonds for sewers.

Washington, D. C.—Commissioners want $882,000 appropriated next year for sewers and sewage disposal.

Weatherford, Tex.—$25,000 bonds recently voted, will be issued.

Contracts Awarded

Anadarko, O. T.—Contract for sanitary sewer system to Doyle and Schwartz, Colorado Springs, Col., at $19,120.

Cincinnati, O.—Contract for sewer on Sylvan avenue, to T. P. Stack, at $19,630.

Columbus, O.—Contract for filter screens, to Coffin Valve Company, Boston, Mass., at $17,967.

Grand Rapids, Mich.—Contract for sewers on Fulton and Island streets, to Kloote and Vanderveer, at $15,400.

JAMES M. CAIRD
Assoc. Am. Soc. C E.
Chemist and Bacteriologist
Office and Laboratory:
271 River Street, Troy, N. Y.
Water Analysis and Tests of Filter Plants

W. R. CONARD
Inspector of Iron Castings
Including: Building, Bridge and Sewer Castings, Valves and Hydrants.
Specialty: Water and Gas Pipe and Specials for same.
1004 High Street, Burlington, N. J.

Sewer Construction AND **PIPE LAYING TOOLS** A SPECIALTY
Write for Catalog
J. G. POLLARD
141 Raymond Street
BROOKLYN, N. Y.

THOMAS HAWKES
LANDSCAPE ARCHITECT
1532 Monadnock Block
CHICAGO
Designs Prepared for Parks, Cemeteries, Private Estates, Subdivisions, &c.
Correspondence Solicited
Tel., Harrison 3652

J. W. HOWARD, C. E.,
1 Broadway, New York
In person or by mail. 23 years experience.
Full equipped laboratory.
Information, Inspection, Reports,
Asphalt and other Pavements
Paving materials, Machinery, Men, Companies, Specifications, Formulae, Analyses, Litigation.

U. S. MAIL CHUTES
The Cutler Patent Mailing System installed by the Sole Makers.
THE CUTLER MFG. CO., Rochester, N. Y.

PATENTS
promptly obtained OR NO FEE. Trade-Marks, Caveats, Copyrights and Labels registered. TWENTY YEARS' PRACTICE. Highest references. Send model, sketch or photo. for free report on patentability. All business confidential. HAND-BOOK FREE. Explains everything. Tells How to Obtain and Sell Patents, What Inventions Will Pay, How to Get a Partner, explains best mechanical movements, and contains 300 other subjects of importance to inventors. Address: H. B. WILLSON & CO., PATENT ATTORNEYS.
871 F STREET, N. W., WASHINGTON D. C.

"The Municipal Journal and Engineer, of New York, is the foremost journal of its character in the country, and an authority on the subject of road and street building."—*Times,* Leavenworth, Kansas.

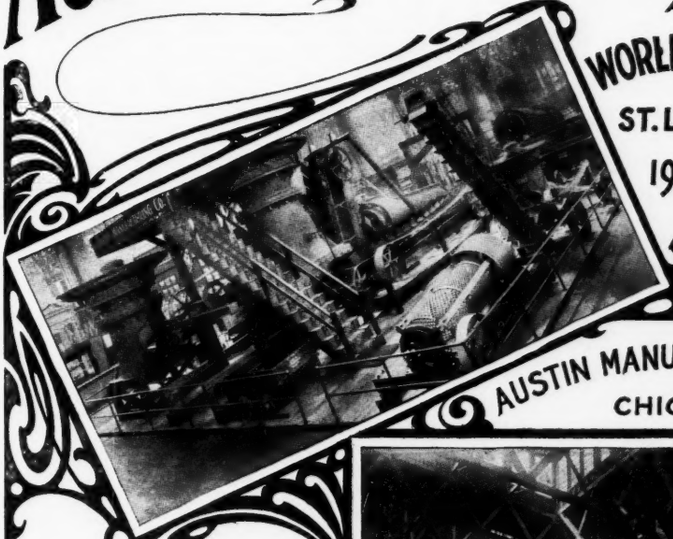
"No person interested in municipal work and public improvements can afford to do without this magazine."—*Terre Haute Gazette.*

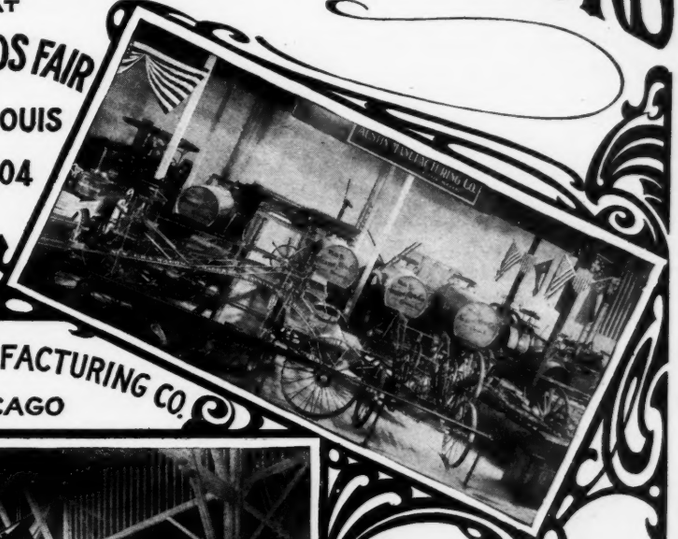
"Is recognized everywhere as authority in all matters which bear upon the growth and improvement of cities."—*The Sun,* Springfield, O.

"Is a periodical that should be placed by the city in the hands of every councilman and city official."—*Scranton Tribune,* Scranton, Pa.

AUSTIN MACHINERY GIVEN HIGHEST AWARDS OVER ALL COMPETITORS

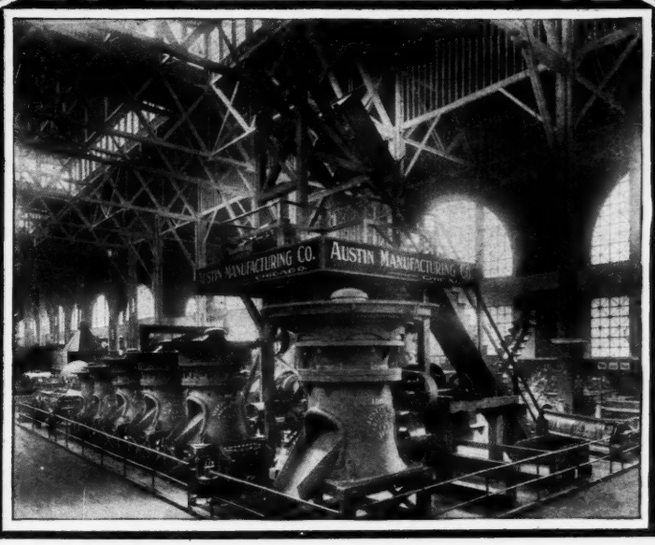
TWO GRAND PRIZES
THREE GOLD MEDALS
AT
WORLDS FAIR
ST. LOUIS
1904





AUSTIN MANUFACTURING CO.
CHICAGO

The
AUSTIN GYRATORY CRUSHER
EXHIBIT
was the ONLY Gyratory Crusher Exhibit to be given both the
GRAND PRIZE
AND A GOLD MEDAL
thus officially stamping
THE AUSTIN GYRATORY CRUSHER
by the
International Jury
as the
HIGHEST TYPE OF GYRATORY CRUSHER IN THE WORLD



The
AUSTIN ROAD AND CONTRACTORS MACHINERY
in a separate Exhibit
was awarded
A GRAND PRIZE
AND
A GOLD MEDAL
being the
HIGHEST AWARDS EVER GIVEN to one Company for Machinery of that Nature
in the
HISTORY OF WORLDS FAIRS

Austin Gyratory Crusher's Great Triumph over its Competitors at the St. Louis World's Fair.

The "Austin" was distinguished by receiving the HIGHEST AWARDS within the power of the Fair to bestow, and HIGHER AWARDS than were granted to any other crusher.

The "Austin" completely Overshadowed and Outclassed its Competitors.

The "Austin" was THE ONLY GYRATORY CRUSHER to receive both THE GRAND PRIZE AND A GOLD MEDAL.

The "Austin" was THE ONLY GYRATORY CRUSHER granted an award as a Ballast Breaker by the International Jury of the Transportation Department.

The "Austin" received the HIGHEST POSSIBLE AWARD as an Ore Crusher by the International Jury of the Mines and Metallurgy Department.

The "Austin" was the LARGEST GYRATORY CRUSHER EXHIBIT at the Fair.

The "Austin" was the LARGEST SINGLE CRUSHER at the Fair.

The "Austin" was the ONLY EXCLUSIVE GYRATORY CRUSHER EXHIBIT to receive an award.

The "Austin" was granted these EXCLUSIVE and HIGHEST awards for SUPERIORITY of DESIGN and EXCELLENCE of CONSTRUCTION.

It would seem from the above official record that the "Austin" captured everything in the Gyratory Crusher line at the Fair, which is not entirely so, as one other Gyratory Crusher participated in the division of one award by being a small part of a large exhibit of miscellaneous Mining Machinery, which was granted A SINGLE AWARD COVERING THE ENTIRE EXHIBIT.

Highland Park, Mich.—Contract for sewer, to Whittaker and Son, Detroit, at $8,303.

Hudson, Mass.—Contract for sewer system to G. M. Bryant, at $36,160.

Indiana Harbor, Ind.—Contract for brick sewage station, to National Construction Company, South Bend, at about $40,000.

Jersey City, N. J.—Contract for relief sewer for Jackson avenue, reported awarded to J. Roosevelt Shanley, Newark, at about $158,000.

Mitchell, S. D.—Contract for sewer, to I. W. Seaman, at $60,000.

Newark, N. J.—Contract for sewers: Section 3, to Chas. Ippolito, Orange, at $11,220; section 4, to Antonio Costa, Orange, at $8,740; section 5, to Jas. Christie, at $11,452.

Peoria, Ill.—Contract for North Peoria sewer, to Harding and Nelson, Racine, Wis., at $87,969.

Philadelphia, Pa.—Contracts, reported awarded: Castor road and Pratt street, to M. J. Hogan and Company, 1,020 Real Estate Trust building, at $28,833; also to Hogan and Company, sewer on Ninth street, at $21,275; Ashdale street, to David McMahon, Germantown, at $46,813; Duncannon avenue, to Henderson and Company, 1,221 Arch street, at $10,900.

San Diego, Cal.—Contract awarded to J. S. Schirm for pipe and "Y"s, at $17,093.

Washington, D. C.—Contract for sewer pipe and specials for Isthmian canal to American Sewer Pipe Company, Pittsburg, Pa., at $19,269, f. o. b., Colon.

WATER SUPPLY

Ames, Ia.—Recently voted to issue $28,000 bonds for extending water works system.

Anadarko, O. T.—It is reported that $30,000 bonds have been sold for the construction of water works.

Attleboro, Mass.—Plans have been approved for new water supply, for which $115,000 were recently appropriated.

Baltimore, Md.—Board of Estimates has divided Water Board's appropriation, as follows: For purchase of local water works, $200,000; for reservoir, $135,000; other expenses, $24,000.

Bangor, Me.—Reported to have passed ordinance to install a $15,000 alum plant for filtration at water works.

Buffalo, N. Y.—$22,000 bonds have been voted for a fire-fighting pipe line to be laid on Pearl street. City will do work and buy material. Plans have been prepared, by Col. Ward, for the following improvements: New tunnel, $250,000; new pumping station, $550,000; replacing present station with fireproof building and extending trunk water mains, $550,000; total $1,300,000.

Camilla, Ga.—$11,000 bonds, recently voted, for the construction of water works system.

Carrollton, Ga.—$45,000 bonds have been sold for water works. Will begin at once on work.

Catskill, N. Y.—Voted recently to lay water main across a creek, to cost $6,500.

Chambersburg, Pa.—Engineer has been secured to make preliminary surveys for water works.

Chattanooga, Tenn.—Standpipe will be erected on Cameron hill.

Clarksville, Ga.—Considering installing water works next year. Data wanted on the subject.

Cleveland, O.—Considering spending $20,000 more for water pipe.

Clyde, O.—Two new boilers will be installed at water works.

Colfax, Wash.—Reported to have voted to construct gravity water system, recently, to cost $55,000.

Columbus, O.—Proposed filtration system includes: Filtration, $300,000; water softening, $80,000; temporary pumping plant, $37,400; pumping station, $190,000; pumps and boilers, $237,000; foundations, $27,500; special castings and pipes, $7,700; standpipes, $33,550; distributing system, $198,000.

Crestline, O.—Recently voted $75,000 bonds for the construction of water works.

Denton, Tex.—Considering issuing $25,000 bonds for water works.

Elyria, O.—Will buy 5,000,000-gallon pump, estimated at $25,000.

Fairfield, Neb.—$13,000 bonds voted recently for water works.

Forrestport, N. Y.—$22,000 bonds voted recently for a water works system.

Ft. Pierre, S. D.—Recently voted $30,000 bonds for the construction of water works.

Girard, O.—Considering the question of installing a municipal water works, estimated at $70,000.

Hardwick, Vt.—Water works will be extended next spring. Estimate, $15,000.

Hartford, Conn.—Old water main on Clark street will be replaced with 1,900 feet of 6-inch iron pipe, estimated at $8,000.

Holland, Minn.—Bids wanted on December 19 for construction of water works.

Iowa Falls, Ia.—Bids wanted about January 1 for improvements to water works.

Jersey City, N. J.—Board of Finance has appropriated $22,000 for new water main in Hudson City. Work may start at once.

Kansas City, Mo.—Bids wanted for two pumping engines at Quirando and one at Turkey Creek pumping stations. Mr. Benzenberg, Board of Public Works.

Laharpe, Kan.—Considering the construction of a $15,000 water works.

Lakewood, O.—$13,991.22 water main bonds will be sold.

Lebanon, Pa.—Bonds will be issued of which $110,000 will be spent for pipe line and $55,000 for mains.

Lewisburg, O.—Estimate has been made for a $14,000 water works system.

Lorain, O.—$10,000 bonds will be issued for a settling basin at water works.

Lumberton, Miss.—Reported to have sold $20,000 bonds for the construction of water works.

McKeesport, Pa.—Estimated cost of filtration plant is $90,000.

McMinnville, Ore.—Will vote on issuing $80,000 bonds for a gravity water system.

Marshall, Minn.—Estimated cost of overhauling city water plant and light plant is $20,000; work to take two years.

Martinsville, Va.—Will vote on December 15 on bond issue for water works.

Melrose, Mass.—Will borrow $10,000 for water works purposes.

Milwaukee, Wis.—City Engineer estimates the cost of necessary additions to Jones Island pumping station at $75,000.

Minneapolis, Minn.—At a recent election it was voted to issue $1,000,000 for improvements of water works and installation of filtration plant.

Muscatine, Ia.—Recently voted to issue $60,000 bonds for improving water works.

Nacogdoches, Tex.—May issue $50,000 bonds for construction of water works system.

New Albany, Miss.—Proposed municipal water works will need a 750,000-gallon, duplex pump; heater feed pump; 60-kilowatt, single phase, alternating current, 2,300-volt dynamo; 100-horse-power engine; 200 tons of pipe. Estimate, $20,000.

Newroads, La.—Recently voted $14,000 bonds for water works system.

Niagara Falls, Ont., Can.—Will issue $8,000 bonds for extensions to water works.

Oakland, Cal.—$10,000 have been appropriated for and plans will be drawn up for a salt water sprinking plant.

Orange, Cal.—Will vote on issuing $50,000 bonds for water works plant.

Osceola, Neb.—Plans are being prepared for a $25,000 water works system.

Paynette, Wis.—Recently voted to issue $12,000 bonds for water works.

Philadelphia, Pa.—Appropriation has been approved for issuing $305,000 bonds for increasing water supply for West Philadelphia.

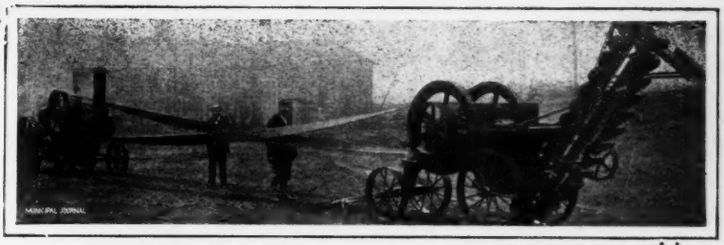
Pittsburg, Tex.—$18,000 water works system will be installed next spring.

Princeton, Ky.—$50,000 bonds recently voted for water works.

River Rouge, Mich.—Water mains will be extended to the amount of $11,200.

Rockford, Wash.—Recently voted to issue $5,398 bonds for the construction of water works.

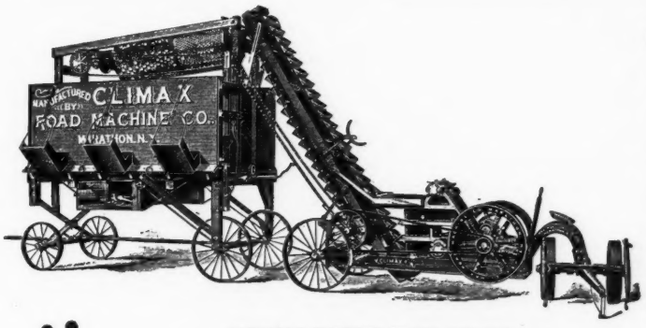
Get the Best Machinery
to
Get the Best Results



We deal only in the highest grade machinery for Road Building, Paving and General Construction work. Large stock of new and second-hand equipment always on hand for municipal and public works contractors. Write for monthly list of special offerings. Prompt deliveries and low prices.

Continental Ry. Equipment Co., 42 Broadway, New York.

Eastern Agts. Ind. Road Mchy. Co., Erie Machine Shops, and others.

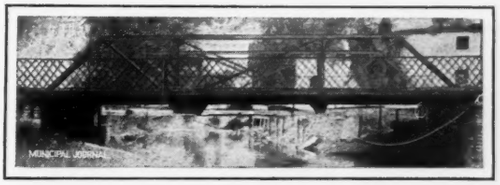


PORTABLE CRUSHER PLANT AND BIN.

Climax Road Machine Company
MARATHON, N. Y.

EVERYTHING FOR THE ROAD BUILDER

Stone Crushers, Road Machinery, Road Rollers, Distributing Wagons, Engines, Complete Crusher Plants.



BRIDGE AT LISLE, NEW YORK.

Highway Bridges and Steel Structural Work.
Special attention given to Municipal Business.

Cameron Septic Tank Company

AN APPROVED SYSTEM OF SEWAGE DISPOSAL FOR LARGE AND SMALL MUNICIPALITIES :: :: ::

Satisfactory and Economical

Write for booklet

H. D. WYLLIE, Gen. Manager
812-813 Monadnock Bldg, .. CHICAGO, ILL.

Garbage Incinerating Plants

The problem of how best to dispose of the waste matter of your cities is solved.

Our system though comparatively new has been demonstrated in the operation of the plants which we have erected to be the **BEST.**

PERFECT SANITATION and an **UTTER ABSENCE** of the disagreeable features surrounding the average garbage disposal plant is what **WE HAVE SOUGHT**—and this **WE HAVE ACCOMPLISHED. EVERY FORM** of refuse can be destroyed in one of our incinerators.

No Odorous Gases No Dirt

We will furnish estimates for any size plant desired. Write for particulars.

The Clinton Fdy. & Mach. Co.
95 LIBERTY STREET NEW YORK

St. John, N. B., Can.—Surveys have been started for the extension of water system to Loch Lomond.

St. Louis, Mo.—Water Commissioner Adkins estimates cost of proposed improvements to water works at $1,000,000, which includes two boilers, new gravity station, settling basin, larger pumping plant, etc.

St. Paul, Minn.—City Engineer estimates the cost of extending water mains and other improvements at $62,700.

Salisbury, Mo.—Recently voted $20,000 bonds for water works.

Scotia, N. Y.—Reported to have voted recently to construct a $50,000 water works.

Seattle, Wash.—Water mains will be laid on Phinney avenue, estimated at $49,500. May lay water mains on Western and other avenues, estimated to cost $95,500.

South Norwalk, Conn.—Plans will be finished soon for a $60,000 filter plant.

Spokane, Wash.—Plans have been completed for a 1,000,000-gall storage tank. Plans for other improvements will be prepared and acted upon in the spring.

Spooner, Wis.—Recently voted for the installation of a $11,000 municipal water works.

Springfield, Mass.—Special committee reports that improvements to Ludlow water system will total up to $482,235.

Tacoma, Wash.—Two plans have been prepared for new water supply; one is $1,250,000 and the other is $400,000.

Tryon, N. C.—Will vote December 6 on $20,000 bond issue for water works system.

Waco, Tex.—$306,000 water bonds have been sold.

Washington, D. C.—New water works machinery required will include one 750,000-gallon compound pump, two 60-horse-power boilers, 1,000,000-gallon reservoir, one standpipe and three miles of water mains.

Woodward, O. T.—$50,000 bonds voted recently for water works.

Contracts Awarded

Bordentown, N. J.—Contract for water works, to Hugh J. Kelly Jr., New York City, at $66,157.

Charlotte, N. C.—Contract for water-works improvements, to Harmon S. Palmer Concrete Building Block Company, Washington, D. C., at $17,110.55.

Ft. Ethan Allen, Vt.—Contract for steel tank and trestle, to Cooper-Wigand-Cook Company, at $10,960.

Ft. Meade, S. D.—Contract for 500,000-gallon reinforced concrete reservoir, to Donnegan and Syken, Shenandoah, Ia., at $11,300.

Harvey, N. D.—Contract for water works and sewerage system reported let to Fargo Plumbing Company, Fargo, at $11,125.

Hastings, Pa.—Contract for pump, valves, etc., for water works, to Hohn and Hewitt, Geneva, O., at $13,000.

Hebron, Ill.—Contract for pumping station for water works, to National Construction Company, South Bend, Ind., at $14,000.

Kansas City, Mo.—Contract for 25,000,000-gallon pump for Quinardo station to Camden Iron Works, Camden, N. J., at $14,495.

Knoxville, Ky.—Contract for water works, reported awarded to W. W. Cook and Son, Junction City, Kan., at $608,175.

New York City (Manhattan and Bronx).—Contract for laying water mains in various streets, to John Cornwell, 69 East One-hundred and twenty-seventh street, at $118,242.

Philadelphia, Pa.—Contract for Torresdale and Belmont preliminary filters, to D. J. McNicol, at $1,334,000 and $218,000 respectively. Contract for League Island Navy Yard pumping plant, to Pneumatic Engineering Company, 128 Broadway, New York City, at $13,257.

Springfield, O.—Contract for new engine, to Wm. Todd and Company, Youngstown, at $40,000.

Toronto, Ont., Can.—Contract for 36-inch cast iron water main in Bathhurst, to Construction and Paving Company, at $36,450.

LIGHTING

Aberdeen, Miss.—Will rebuild municipal electric light plant next year.

Camilla, Ga.—Recently voted $25,000 bonds for the construction of an electric light plant and water works.

Cambellford, Ont., Can.—Considering the erection of a $30,000 electric light plant.

Chattanooga, Tenn.—May erect a municipal electric light plant.

Columbia, Ky.—New electric light plant will be installed.

Columbus, O.—Bonds have been sold for electric light plant.

Covington, Ky.—Engineer has been selected to draw up preliminary plans for a municipal electric light plant.

Fredericksburg, Va.—Considering the erection of a $25,000 gas plant.

Frederickstown, O.—Voted $20,000 bonds for the construction of an electric light plant.

Greensboro, Ga.—Bonds voted recently for a municipal electric light plant.

Holyoke, Mass.—Ordinance passed to borrow $30,000 for enlarging and reconstructing electric light plant.

Ilion, N. Y.—$25,000 bonds sold for electric light plant improvements.

Kearny, N. J.—Estimated cost of municipal electric light plant is from $30,000 to $40,000. Plans are being drawn up.

Marshall, Minn.—Estimated cost of overhauling city light and water plant is $20,000, which will take 2 years.

Martinsville, Va.—Will vote on December 15 on bond issue for electric light plant.

Milwaukee, Wis.—City Controller has signed bond ordinance for $150,000 for municipal electric light plant.

Morrisville, N. Y.—100-horse-power engine will be installed in electric light plant.

Newark, O.—Considering changing present electric light system to alternating, which will cost $14,000.

Oneida, N. Y.—Bids wanted January 1 for an electric power plant at Limekiln Falls, estimated at $125,000. Dewitt C. Haddock, C. E.

Orange, Cal.—Will vote on $15,000 bond issue for electric light plant.

St. Joseph, Mo.—Bids wanted for the erection of a municipal electric light plant, estimated at $76,369.

Seattle, Wash.—Considering a $300,000 bond issue to increase city electric light plant.

Stoughton, Wis.—Recently voted $25,000 bonds for municipal electric light plant, it is reported.

Thomasville, Ga.—Recently voted to issue $35,000 bonds for municipal electric light plant. May buy local plant or build.

Troy, Mo.—Reported to have voted $10,000 bonds, recently, for an electric light plant.

Watkins, N. Y.—Reported to have sold $20,000 bonds for municipal electric light plant.

Waverly, Ia.—Plans are being prepared for an electric light plant.

Waynesboro, Ga.—Recently voted to issue bonds for the erection of an electric light plant.

Wayne, Mich.—$8,000 bonds have been voted for lighting, it is reported.

West Point, N. Y.—All bids rejected for boilers, pumps, power machines, etc., received August 9 and will soon want new ones.

West Seattle, Wash.—Considering the erection of an electric light plant to be run in conjunction with municipal car line.

York, Pa.—Voted recently to install electric light plant.

PULBIC BUILDINGS

Akron, O.—Reported to have voted recently to erect a $300,000 courthouse.

Atlanta, Ga.—Plans being prepared for $300,000 additions to Federal prison here.

Baltimore, Md.—$150,000 has been appropriated for courthouse repairs. $120,000 has been appropriated for the construction of Eastern Female high school. Additions, estimated at $14,000, will be put on the city jail next year.

Battle Creek, Mich.—Plans and specifications have been revised, for $100,000 Federal building. Bids wanted about January 1.

Berlin, Pa.—$250,000 courthouse bonds have been sold.

Birmingham, Ala.—Plans have been adopted for $125,000 high school building.

PUBLIC OFFICIALS

contemplating the purchase of Wagons for collection of Garbage and Refuse, or for Construction Work of any kind, and

GENERAL CONTRACTORS

who want the best wagon for their money should send for our Catalogue and prices. We manufacture Wagons and Contractors' Carts of every description.

HAYWOOD WAGON COMPANY, Baldwinsville, N. Y.

A Dump Wagon

THAT CANNOT STALL

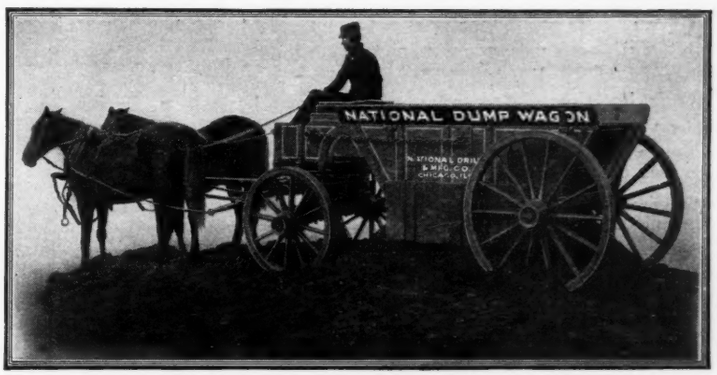
TIGHT JOINTS TOO

SEE THAT LOOP!

EASY TO LOAD
EASY TO DUMP
EASY TO HAUL
EASY TO CLOSE

Let Us Tell You About It

NATIONAL DRILL & MFG. CO.
PULLMAN BUILDING, CHICAGO



THE NATIONAL DUMP WAGON. Pat. Aug. 11, 1903.

JOSIAH F. DAY GARBAGE WAGON

THIS SHOWS WAGON READY TO LOAD

We show here the best Garbage Wagon on the market, especially adapted for handling of ashes, refuse, etc., in cities and towns.

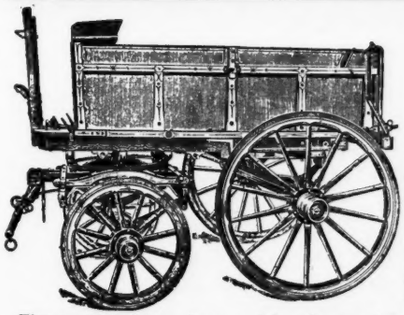
Built in 2-yd., 3-yd. and 4-yd. capacity. We also are building this style wagon for Contractors' use, as well as a full line of Contractors' Carts and Wagons.

Write us for prices and terms and special catalog.

COLUMBIA WAGON CO.
COLUMBIA, PA., U. S. A.

THE **SHADBOLT** NEW **DUMPING WAGON**
For CONTRACTORS and MUNICIPAL USE.

YOU WILL FIND DOLLARS IN
$SHADBOLT$
FIRST AND LAST
In Efficient Service. In Economical Maintenance.



The wagon shown here weighs about 2,800 pounds and contains 54 cubic feet, water measure, with the detachable wing-boards on. We build any size desired.

THIS new design meets the very general want of a simple, strong, moderate priced Dumping Wagon for Contractors and Municipal use. The body slides back on the frame and dumps; this being effected without use of rack or pinion. It is not possible for the crank to be forced out of the hand and *injure the operator*. It has no wheels or rollers to wear flat. The construction is such that the body can be brought back into position, after being dumped, very easily *with the tail-board on*, by one man. The load being properly distributed over both axles the *greatest ease of draft* is secured.

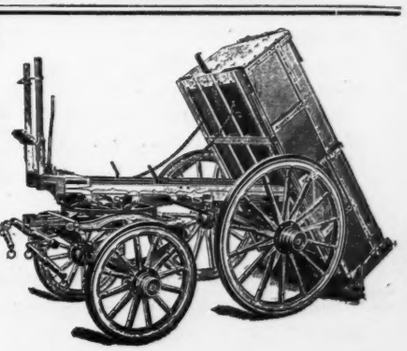
Dumping Wagons specially designed for Asphalt, Garbage and other special lines.

We also build the

CHARLTON STREET SWEEPER

which picks up the dirt as it sweeps, will cover 18 miles six feet wide per day with one pair of horses. Sweeps cleaner than hand work.

With the recent enlargement of our factory facilities by 20% and full up-to-date equipment, we are prepared to meet the increasing demand for our vehicles.



SHADBOLT M.FG. CO., BROOKLYN, N.Y.
68 TO 78 FLUSHING AVE.

Brunswick, Ga.—May erect a $40,000 court house in 1905.

Camden, S. C.—County Commissioners want bids, December 17, for a $25,000 court house.

Chicago, Ill.—Will erect a $250,000 police headquarters.

Cincinnati, O.—Plans are being prepared for an $85,000 school building.

Corsicana, Tex.—$150,000 bond issue for court house, reported voted.

Denver, Col.—Bids wanted, December 17, for a $240,000 library on Colfax avenue.

Des Moines, Ia.—Recently voted to issue $250,000 bonds for completion of Polk County court house.

Eatonton, Ga.—$30,000 bonds for Putnam County court house have been sold.

Elbow Lake, Minn.—Grant county will erect a $50,000 court house.

Elkins, Pa.—Plans have been completed for a $60,000 high school building.

Fergus Falls, Minn.—Voted $45,000 bonds for new school building.

Harrison, N. J.—Recently voted to erect a $40,000 school building.

Haverhill, Mass.—$40,000 armory building will be erected.

Joliet, Ill.—May erect a $200,000 city hall.

Lawton, O. T.—Bonds have been voted for a $25,000 city hall.

Little Rock, Ark.—$100,000 court house may be built on Ouchita avenue.

Louisville, Ky.—$325,000 armory will be erected.

McMechen, W. Va.—$50,000 school building will be erected.

Madison, Wis.—Considering the erection of a $250,000 school building.

Manitowoc, Wis.—Plans have been accepted by Court House Committee for $150,000 stone court house.

Meriden, Conn.—$150,000 bonds recently voted for several new school buildings.

Milwaukee, Wis.—$225,000 school building will probably be erected each year for the next three years.

Minneapolis, Minn.—At recent election it was voted to issue $100,000 bonds for graded school buildings and $100,000 bonds for high school building.

Montgomery, Ala.—$150,000 has been appropriated for remodeling the Capitol.

Murray, Utah.—Has plans for a $12,000 city hall.

New York, N. Y. (Brooklyn). Will issue $230,910 bonds for borough building. Plans have been filed for $76,000 library at Eighth street and Sixteenth avenue; $345,000 six-story, brick and stone school at Madison and Jackson streets; $98,000 four-story addition to school on Driggs avenue; $135,000 addition to school on Van Alst and Ninth streets; $115,000 police station in Tenderloin.

Norman, O. T.—Considering the erection of a $40,000 court house.

Ocala, Fla.—Plans have been prepared for $45,000 improvements to Marion County court house.

Paris, Ill.—Considering the erection of a $35,000 high school building.

Paterson, N. J.—$54,000 bonds will be issued for school in Weavertown district.

Philadelphia, Pa.—Bids wanted for 5 school buildings, estimated to cost $327,000. Considering additions to Homesburg station of the county prison to cost $75,000.

Purvis, Miss.—Architect is preparing plans for courthouse for Lamar County, estimated to cost $50,000.

Rushville, Neb.—Sheridan County has prepared plans for a $25,000 courthouse.

St. Louis, Mo.—Plans are being drawn for the Shepard and Shields school buildings, to cost $130,000.

San Francisco, Cal.—Considering $100,000 bond issue for courthouse and $125,000 issue for schools.

Seattle, Wash.—Plans have been completed for a $65,000 school building. May issue $500,000 bonds for a city hall and will vote on December 6 on bond issue of $175,000 for jail and hospital buildings.

Seward, Neb.—$100,000 bonds, recently voted for a courthouse.

Shawnee, O. T.—$30,000 city hall bonds reported to have been sold.

Somerset, Pa.—$250,000 courthouse bonds have been sold.

Steubenville, O.—Architect J. R. Webster has plans for a $60,000 high school.

Syracuse, N. Y.—Considering the following repairs and additions to school buildings, next year: Jackson, $15,000; Garfield, $15,000; Irving, $15,000; Sumner, $15,000; Groton, Delaware and Putnam, $15,000 each; new, Vine, $30,000; new, Salina, $65,000.

Valdosta, Ga.—$35,000 school bonds have been voted recently.

Washington, D. C.—Bids wanted December 14 for post-office, court and custom houses, Biloxi, Miss.; December 15, post-office, Norristown, Pa.; December 12, post-office, court and custom houses, Providence, R. I. James Knox Tyler, Supervising Architect, Treasury Department. The Commissioners want the following appropriations for next year: $75,000 for new police court; $50,000 for 2 public comfort stations; $150,000 for tuberculosis wards, Municipal hospital; $255,000 for schools and additions; $600,000 for District building.

Webster Grove, Mo.—$40,000 bonds have been voted for a high school.

Yazoo City, Miss.—Will sell on December 12, $100,000 bonds for municipal building and improvements. F. J. Poursine, City Clerk.

CONTRACTS AWARDED (PUBLIC BUILDINGS)

Allegheny, Pa.—Contracts for new school building, at $50,000 and an addition to 11th ward building, at $40,000, to Rose and Fisher.

Amarillo, Tex.—Contract for courthouse to J. J. Holt, at $50,000.

Anadarko, O. T.—Contract for courthouse and jail, to L. Crosby, Kansas City, Mo., at $39,705.

Boston, Mass.—Contract for Lyman school to Henry McGahey, 218 Main street, Cambridge, at about $105,000.

Columbus, Ga.—Contract for municipal building, to C. E. Young Company, at $18,000.

Convent, La.—Contract for courthouse to Leman and Company, Lansville, Ky., at $20,000.

Davenport, Ia.—Contract for school to H. B. Walter, Danville, Ill., at $198,350.

Eveletn, Minn.—Contract for brick school to Theo. Nauffts, Duluth, at $38,000.

Homestead, Pa.—Contract for municipal building to Bodine and Company, Pittsburg, at $21,680.

Pittsburg, Pa.—Contract for brick school on Greenfield avenue, to W. H. Jack Construction Company, at about $50,000.

FIRE DEPARTMENT SUPPLIES

Ashbourne, Pa.—Plans being prepared by Duhring, Okie and Ziegler, Architects, Philadelphia, for a two-story engine house for Old York Road Fire Engine Company.

Athens, Ga.—Will purchase $2,000 worth of new fire apparatus.

Baltimore, Md.—$96,500 has been appropriated for two fire-engine houses, equipment, steamers, etc. Fire Board wants $915,000 appropriated for thirteen engine houses, fireboat and other improvements.

Birmingham, Ala.—Considering erecting fire stations in residence portion of the city.

Bisbee, Ariz.—$7,000 has been appropriated for fire protection mains.

Bridgeport, Conn.—Will buy a chemical engine and may equip hose wagons with chemical tanks. Board of Fire Commissioners.

Chicago, Ill.—Considering the erection of a fire-engine house at 150 Southport avenue, to cost $10,000.

Cleburne, Tex.—Plans have been prepared for a city hall and fire station to cost $5,000.

Columbus, O.—Will repair engine, police and patrol houses, estimated at $8,000.

Dayton, O.—Will buy a fire engine.

Des Moines, Ia.—Committee has been appointed to investigate additional fire protection. Will buy 3,000 feet of fire hose at once and will soon re-advertise for bids for new engine house.

Detroit, Mich.—Plans have been prepared for new engine house at Riopelle street and Milwaukee avenue.

Hoboken, N. J.—Underwriters recommend that fire department be improved to the amount of $200,000.

Kansas City, Mo.—Plans will be drawn for fire station to be erected at Twelfth and Genesee streets. Bids will be called for soon

Dumping Wagons That Dump

The claims made for many wagons cannot be substantiated—experience teaches that fact—expensive education for you.

BUY A WATSON

Original and still the best. Built of the best materials, built on tested lines—not an experiment. Does the work needed day after day and year after year—no big repair bills. Bottom opens full size of box, and the load dumps quickly, clean, without stopping the team. Dumps out every atom that goes in and dumps every opposition argument at same time.

WATSON WAGON CO., Cor. Center and Buck Sts., Canastota, N.Y.

NO FACTORY in the world approaches that of the Studebakers in the extent and variety of its output. This output embraces everything in the way of business and pleasure vehicles, including electric and gasoline Automobiles; also Street Sprinklers, Street Sweepers, Dump Wagons, Contractors' wagons and Carts, Etc.

STUDEBAKER

WINS THE

DOUBLE GRAND PRIZE

(THE HIGHEST AWARD)

LOUISIANA PURCHASE EXPOSITION

ST. LOUIS
1 9 0 4

Studebaker Brothers Mfg. Co.

South Bend
INDIANA

NEW YORK BRANCH
Broadway and 7th Avenue at 48th St.

Branches also at
CHICAGO DALLAS
KANSAS CITY DENVER
SALT LAKE CITY
SAN FRANCISCO
PORTLAND, ORE.

THE STUDEBAKER IS STANDARD THE WORLD OVER

for stations for No. 14 Hose company, No. 17 Engine company and No. 11 Hose company.

Laurens, S. C.—Will purchase new fire engine.

Morrellville, Pa.—Funds are being raised for the purchase of a hose wagon.

New Haven, Conn.—National Board of Fire Underwriters recommend the following improvements to fire equipment: one steam fire engine, one chemical engine, one combination chemical and hose wagon and lead covered cables.

Norwood, O.—Ordinance being prepared authorizing a $10,000 bond issue for equipment to fire and police station.

Piqua, O.—Will buy two combination hose and chemical wagons.

Providence, R. I.—Considering buying two new fire engines.

Riverside, Cal.—May buy a fire engine.

St. Paul, Minn.—Considering amending charter to increase the annual appropriation for fire department from $215,000 to $245,000. Part of the money to be used for equipping three engine companies and a hook and ladder company.

San Francisco, Cal.—Bids wanted soon for the erection of a fire house at Twentieth and Kentucky streets. Considering bond issue of $35,000 for improvements to fire department.

Scranton, Pa.—Judge Edwards has declared valid the $100,000 bond issue for police and fire headquarters and fire alarm system.

Shamokin, Pa.—Voted on November 8 to issue $45,000 bonds for hose house and fire apparatus.

Washington, D. C.—The Commissioners wish the following appropriations for next year: $10,000 for improvements to fire-engine houses and grounds; $10,000 for new apparatus and repairs to old; $13,000 for hose; $25,000 for house and furniture for chemical engine; $30,000 for truck house on "K" street; $4,000 for combination engine and hose wagons; $3,750 for one 65-foot aerial hook and ladder truck; $10,600 for two second size steam fire engines; $9,600 for two third size steam fire engines; $4,500 for one fourth size steam fire engine; $9,000 for 50 additional fire alarm boxes; $10,000 for replacing old magneto telephone switchboard.

Wilkesbarre, Pa.—At recent election it was voted to issue bonds for improvements for fire and police systems.

Winnipeg, Man., B. C.—Considering buying two fire engines.

CONTRACTS AWARDED

Jackson, Miss.—Contract for fire station to G. T. Hallis and Company, Brookhaven, at $13,100.

Valdosta, Ga.—Contract for engine house to W. E. Boothe, at $4,803.

MISCELLANEOUS

Asbury Park, N. J.—Commission is investigating for the construction of a sewage disposal plant. City Clerk.

Baltimore, Md.—Board of Estimates has appropriated $100,000 for the extension of Wyman park.

Bellingham, Wash.—Reported that the Board of Health has recommended the erection of two garbage plants.

Chicago, Ill.—Considering the erection of garbage disposal plants. Estimated cost of same is $1,000,000.

Cleveland, O.—$80,000 bonds will be issued for straightening, deepening, etc., the Cuyahoga river. Ordinance has been passed authorizing grade separation at Dennison and Ridge avenues, to cost $100,000. The grounds of the Kirtland street pumping station will be improved to the extent of $9,500.

Clinton, Mass.—Considering the abolition of grade crossings to cost $182,000.

Duluth, Minn.—Favorable report has been made to install a garbage crematory. Plans have been prepared for a municipal dock to be erected in West Duluth.

East Orange, N. J.—Considering the erection of a garbage crematory.

Jersey City, N. J.—Hudson County recently sold $800,000 park bonds.

Lexington, Ky.—Voted recently to issue $20,000 bonds for an auditorium at Woodland park.

London, Ont., Can.—Will vote in January on installing a garbage disposal system estimated at $10,000.

Long Branch, N. J.—Voted on November 8, to issue $400,000 bonds for improvements to beach front, widen Ocean avenue, lay out parks, etc.

Marion, O.—Garbage disposal plant will be constructed.

Milwaukee, Wis.—Contracts will be let about January 1 for a $6,000 conduit in Eighteenth Ward. Plans are being drawn up for same. Controller Pawinski has estimated that the necessary park work, for the next three years, will cost $275,000.

Montreal, Can.—Plans have been prepared for a new look-out tower on the mountains, to cost $15,000.

Muncie, Ind.—Site for garbage crematory has been secured. Kind of furnace yet to be determined on. Capacity to be 25 tons. City Engineer Crandall.

New Haven, Conn.—The National Board of Fire Underwriters has recommended the removal of all overhead wires in the business section.

New York, N. Y.—Mayor has recently approved an ordinance to issue $243,900 bonds for new plants and apparatus for Department of Street Cleaning in Manhattan, Bronx and Brooklyn.

Orange, N. J.—Garbage crematory will be erected as soon as possible, estimated at $15,000.

Pittsburg, Pa.—Allegheny County Court-house will be enlarged and eight high speed elevators will be installed.

Racine, Wis.—May order all wires placed underground when streets are paved.

St. Louis, Mo.—Ordinance is being prepared for establishing garbage crematories in different parts of the city.

San Francisco, Cal.—Plans are to be drawn up for a conduit system. Reported that citizens of the State have voted $2,000,000 for an extended sea wall.

Topeka, Kan.—Considering the erection of a municipal garbage crematory.

Toronto, Ont., Can.—Considering the erection of two garbage crematories. Street Commissioner Jones.

Washington, D. C.—Commissioners want $50,000, next year, for machinery, etc., to equip the new manual training school, also $500,000 for elimination of grade crossings.

CONTRACTS AWARDED

Boston, Mass.—Bureau of Yards and Docks has let contract for conduit system at Boston Navy Yard, to Metropolitan Constructing Company, 95 Milk street, city, at $8,300.

Marion, O.—Contract for garbage and sewage disposal plant, reported to have been awarded to Clinton Foundry and Machine Company, 95 Liberty street, New York City, at $56,738.

Marysville, Cal.—Contract for 40-horse-power Callahan, crude or distilled oil, engine to G. W. Price Company, San Francisco, at $1,500 installed.

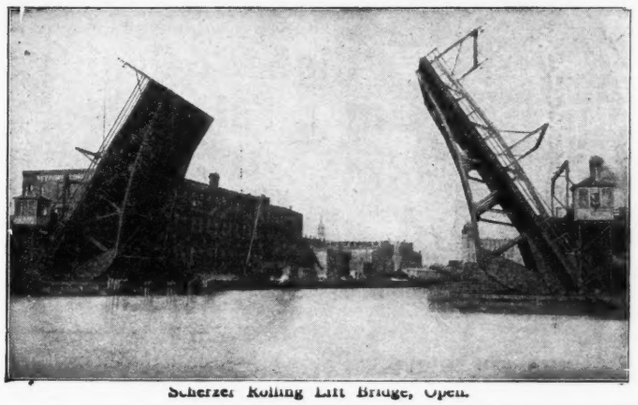
Philadelphia, Pa.—Contract for garbage disposal plant, reported to have been awarded to American Product Company, at $560,000.

Washington, D. C.—Isthmian Canal Commission awarded contract to United Building Material Company, Park Row building, New York City, for 2,400 barrels of Portland cement, f. o. b. Colon, at $4,536.

Southern Creosoting Company, Ltd.

SLIDELL, LOUISANA.

Located in the finest Long Leaf Yellow Pine District in the United States. Capacity 22,000,000 feet B. M. per annum.



Scherzer Rolling Lift Bridge, Open.

"CENTER-PIER SWING BRIDGES form Artificial Obstructions, Destroying Navigation, and are being CONDEMNED, REMOVED and REPLACED by modern SCHERZER ROLLING LIFT BRIDGES wherever Manufactures, Commerce, Transportation and Ships are Valued, Protected and Advanced."

WRITE US FOR INFORMATION

The Scherzer Rolling Lift Bridge Co.

Main Offices: MONADNOCK BLOCK, CHICAGO, U. S. A.

HIGH-POWER SAFETY EXPLOSIVE · THE EXPLOSIVES COMPANY · ELMIRA, N.Y. & NEW YORK CITY · JOVITE JOVEITE JOVITE

High Power Safety Explosive

It is a dry powder and therefore there can be no leaking or sweating

THE IDEAL EXPLOSIVE FOR SUMMER USE

JOVEITE

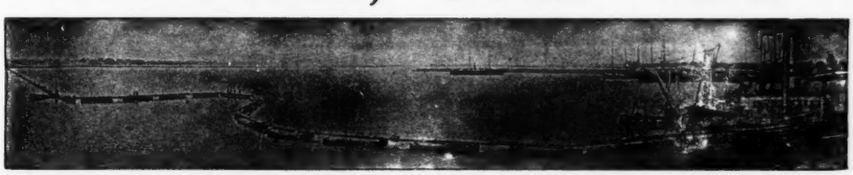
HAS NO EQUAL FOR CITY WORK

The shock is fifty per cent. less than that from other explosives of high power with same results

THE EXPLOSIVES COMPANY

322 BROADWAY NEW YORK ELMIRA NEW YORK

ATLANTIC, GULF AND PACIFIC CO.



Hydraulic Dredge discharging through 5,700 ft. of pipe.

Engineers and Contractors.

Geo. W. Catt, M. Am. Soc. C. E., M. Inst. C. E. Pres. and Eng.
Thos. J. Long, M. Am. So. C. E., Vice-Pres. & Engr.
H. S. Wood, C. E., Sec. & Treas.
H. Krusi, C. E., Pac. Coast Man.
R. A. Perry, Supt.

Specialties: Dredging, Dredging Machines, Land Reclamation, Docks, Piers, Foundations, Bridges. Correspondence solicited.

Main Office, PARK ROW BUILDING, NEW YORK.

BRANCH OFFICES:

220 MARKET STREET, SAN FRANCISCO, CAL. PIONEER BUILDING, SEATTLE, WASH. MANILLA, PHILIPPINE ISLANDS.

IT'S THE BEST

A PAVEMENT that has merited the unstinted praise of civil engineers, city officials and taxpayers alike, and has given satisfaction wherever laid—has fairly won the title of **BEST.** We have laid Warren's Bitulithic Pavement in Port Huron, Bay City and Saginaw, Mich., Newport, Ky., and Ironton, Ohio, and have contracts in Manistee, Cadillac, Charlevoix, Mt. Clements, Mich., and Cincinnati, Ohio. It is the ideal pavement. Information cheerfully furnished by

THE CENTRAL BITULITHIC PAVING COMPANY
MAJESTIC BUILDING, DETROIT, MICH.

W.H. ANDERSON & SONS Inc. *Tools* DETROIT MICH.

"Highest Quality at a Fair Price"

Anything in Tools for Paving, Sewer Building, Stone Cutting, Track Laying, in fact Tools for **CONTRACTORS.**

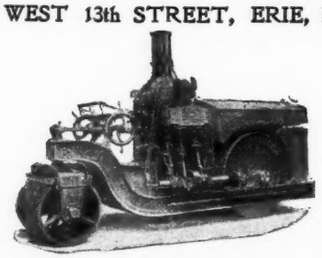
If you want our Catalog J it's yours for the asking

Have you seen our Portable Concrete Mixer?

Erie Machine Shops

89 WEST 13th STREET, ERIE, PA.

P. W. DIETLY
Proprietor



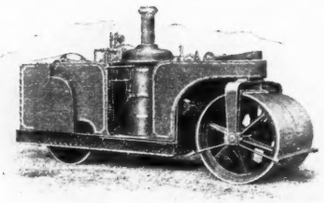
Send for our Catalogue of
ASPHALT ROLLERS and MIXERS

Our 20th Century Roller

New York Agency: CONTINENTAL RAILWAY EQUIPMENT CO., 42 BROADWA .

A. B. C. STREET SWEEPER

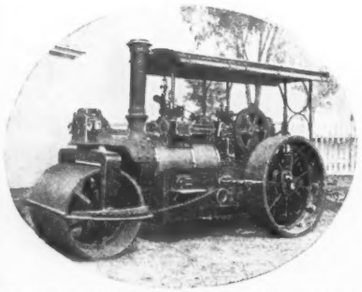
Steam Road Rollers
Combination Roller and Traction Engines
Street Sweepers
Stone Crushers



GENERAL PURPOSE STEAM ROLLER, 6 TO 9 TONS

AMERICAN ROAD ROLLER CO.

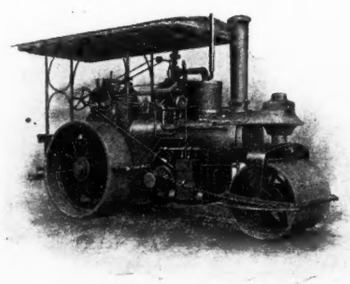
156 Fifth Avenue, NEW YORK **804 Chamber of Commerce Building, CHICAGO, ILL.**
GROTON, TOMPKINS CO., N. Y.



CASTLER STANDARD STEAM ROAD ROLLER. 10, 12, 15 TONS

Street Scrapers
Sanding Wagons
Push Carts
Gasoline Engines, Etc.

Catalogues, Prices and Other Information on Request.



AMERICAN 20,000 POUNDS STEAM ROAD ROLLER

DON'T BUY A STEAM ROAD ROLLER WITHOUT COMPENSATING GEAR

A MODEL SYSTEM OF STREET LIGHTING

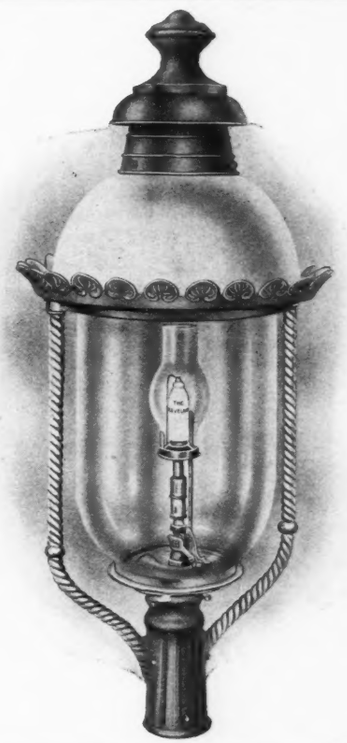
IS the result of using the mantle gas or naphtha lamp in connection with the electric arc. Street lighting experts agree upon this statement:

WHY THE MANTLE LAMP IS PREFERABLE

It affords a better distribution of light.
It lights shaded streets perfectly.
It is the most economical any city can adopt.

The CLEVELAND SYSTEM is SUCCESSFUL

indicated by our being again awarded the contract with the City of St. Paul for 6,500 lamps. Minneapolis awarded us a contract for 3,500 lamps because of the success of our St. Paul contract. Pittsburg has just contracted with us for 4,000 lamps. Some of the other cities using our lamps are Boston, Charleston, Memphis, Muscatine, Ia., Lincoln, Neb., Madison, Wis.



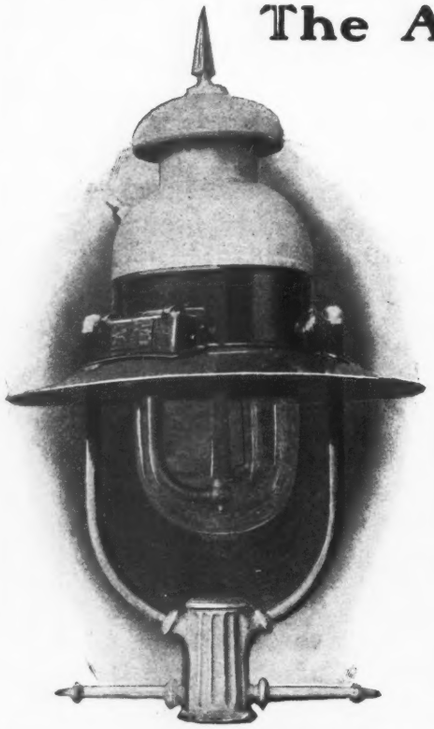
Our Boulevard Gasoline Lamp makes it possible to obtain the same results as from the gas lamp where gas mains do not extend. We will guarantee any town or city a big saving in its lighting bills and a service that cannot be equalled. Write us for particulars. ... ...

CLEVELAND VAPOR LIGHT COMPANY

CLEVELAND, 1800 E. Madison St. **CHICAGO, 21 Quincy St.** **ST. PAUL, 370 Jackson St.**
MINNEAPOLIS, 523 N. Y. Life Bldg. **PITTSBURG, 4780 Liberty St.** **NEW YORK, 1 Broadway**

For Outdoor Lighting

The Auto-Arc Has No Rival



IT automatically generates a pressure which can be changed from 8 to 12 pounds, or vice versa at will, producing a light equal to the best electric arcs.

1 quart of gasoline (costing less than 4 cents) runs the lamp 5 hours. (Think of it!) It performs this feat by burning from 60 to 75% oxygen It is a gas machine and lamp combined, marking a new era in the lamp industry, and is made as good machines are made. Each lamp is complete within itself, no tubes or air pumps. A complete system for lighting anywhere from a **Crowded City** to a **Sleepy Hamlet.** Lighting parks and residence grounds a specialty with us.

Automatic Incandescent Light Co.

FACTORY: NORTHBORO, MASS.

SEND FOR PARTICULARS AND AGENTS' ADDRESSES

Winslow Voting Machines

(ENTIRELY AUTOMATIC)

Adjustable for Class Voting, Minority Representation Voting, Cumulative Voting, Amendment and Proposition Voting, and Restrictive Voting.

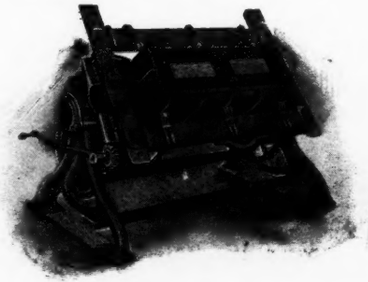
Manufactured by

Winslow Voting Machine Company, Cleveland Ohio

THE WINGET CONCRETE MACHINE COMPANY, 409 The New Hayden Bldg., COLUMBUS, OHIO.

The Winget Machine

for making hollow concrete building blocks is the only **AUTOMATIC, ADJUSTABLE** and **PERFECT** working machine yet produced. It is widely adjustable, making blocks for walls from four to eighteen inches thick, as well as many special designs. It is practically a combination of **TWENTY** machines in **ONE.** The saving of time, material and labor with this machine actually pays its price in a short time. If you are interested write for catalogue and special information.



MACHINE, SHOWING ROCKING POSITION FOR FACING.

New York Telephone
7567 Cortlandt

INTERNATIONAL
SANITARY STREET CLEANER CO.

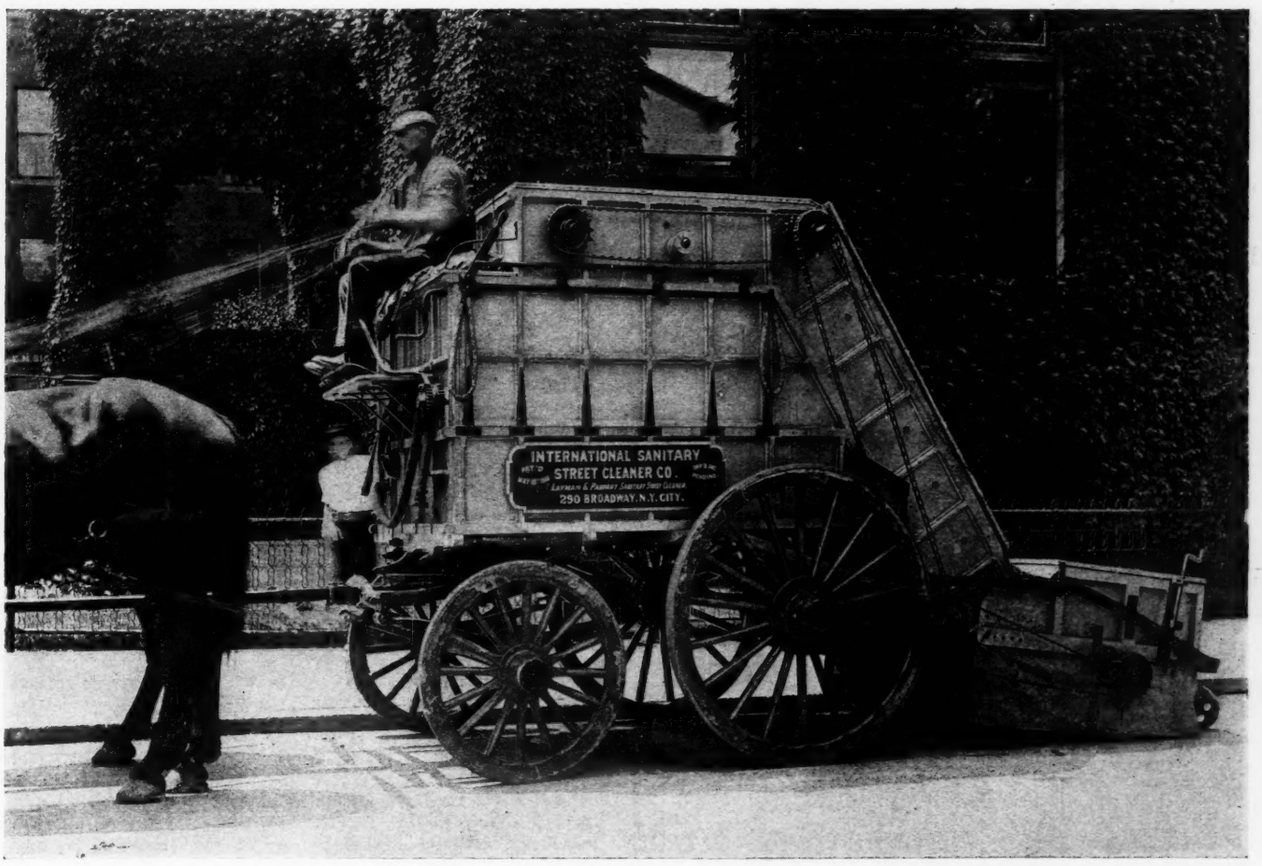
Hartford
Telephone 479

(INCORPORATED.)

NEW YORK OFFICE,
143 Liberty St., New York City

MANUFACTURING HEADQUARTERS
Hartford, Conn.

HARTFORD BRANCH OFFICE,
CONN. MUTUAL LIFE INSURANCE BUILDING, COR. MAIN AND PEARL STREETS.



THE LAYMAN & PARPART SANITARY STREET CLEANER

A WORD TO THE PUBLIC

THE INTERNATIONAL SANITARY STREET CLEANER COMPANY has purchased the entire rights and patents (United States and Foreign), covering the Layman & Parpart Sanitary System of Street Cleaning, and have closed a contract for the manufacture of 500 machines with which to supply orders at home and abroad; these machines can now be turned out quickly, and this Company is in position to fill all orders on reasonably short notice.

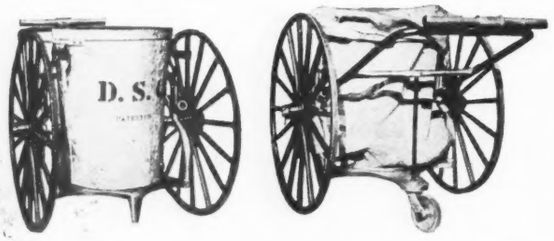
It will therefore be seen that now is the first time in the history of this much needed invention, that contracts for the rental of these machines could be filled.

The merit and absolute efficiency of this method of Sanitary Street Cleaning has been proven and demonstrated beyond question, and has been developed to the highest state of perfection in the manufacture of the machines which we now offer to the public.

Facts Better Than Assertions

5000

of our CAN CARRIERS are, to-day, in use in the City of New York. This is a better endorsement for an article than any mere claim.

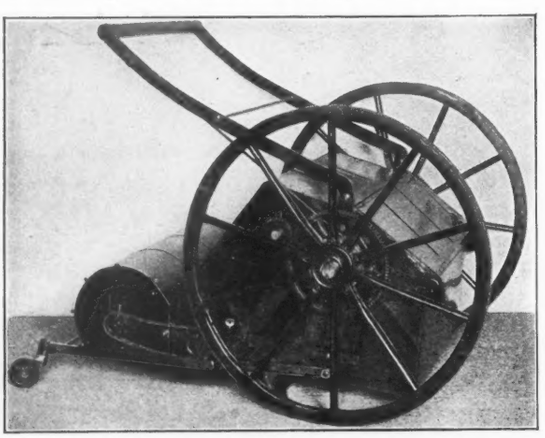


A CAN CARRIER should meet the requirements of Durability, Neatness and Lightness. Our Carrier possesses and has stood the test of time and usage. Write for prices.

FOX BROS. & CO. 24 Vesey Street, NEW YORK.

ONE-MAN-POWER
STREET CLEANING MACHINERY

HAERST'S PATENT



LIGHT RUNNING

No. 2 Sweeping Machine ready for operation.

The box holds three cubic feet of material and can be dumped or replaced with empty box. Revolving Brush is purposely off the ground until brushing should begin, when it descends automatically and goes to work. Scraper for occasional use for hard packed dirt and to knock down piles of horse droppings. DUSTLESS in operation.

This machine thoroughly **cleans 8,000 square feet of Concrete Pavement in 15 minutes.** Built especially for smooth pavements.

E. H. STROUD & CO.,
30 TO 36 LA SALLE ST., CHICAGO, U.S.A.

Index to Advertisers.

For Buyers' Guide and Classified Business Directory, see Page 12.

Acme Road Machinery Co..... 57
American-La France Fire Engine Co. 15
American Road Roller Co..... 42
American Sewer Pipe Co..... 49
Anderson, W. H. & Sons..... 42
Alvord, John W..... 31
Arthur, W. H..... 49
Art Metal Construction Co..... 8
Atlantic, Gulf & Pacific Co..... 41
Austin Mfg. Co..... 33
Automatic Incandescent Light Co.. 4

Barber Asphalt Paving Co..... 57
Barr Clay Co..... 50
Bartlett, C. O., & Snow Co..... 10
Berger Mfg. Co..... 9
Bessemer Limestone Co..... 51
Big Four R'y..... 7
Brossman & King..... 31
Buffalo Clay Mfg. Co..... 52
Buffalo Meter Co..... 18
Buffalo Steam Roller Co..... 43
Byerley & Son..... 44

Caird, Jas. M..... 32
Cameron Septic Tank Co..... 35
Central Bitulithic Paving Co..... 42
Central Foundry Co..... 16
Chicago & Alton Ry..... 10
Chicago & Northwestern Ry..... 10
Chicago Writing Machine Co..... 9
Child, Stephen..... 31
City Wastes Disposal Co..... 30
Clearfield Clay Working Co..... 50
Cleveland Brick Co..... 50
Cleveland Vapor Light Co..... 3
Climax Supply Co..... 10
Climax Road Machinery Co..... 35
Clinton Foundry & Machine Co.. 35
Clinton Paving Brick Co..... 50
Collinwood Shale Brick Co..... 50
Columbia Wagon Co..... 37
Cook, Wm. H., & Co..... 16
Conard, W. R..... 32
Connolly, M. T..... 48
Consolidated Car Fender Co..... 11
Continental Ry. Equipment Co.... 35
Contractors' Equipment Co..... 31
Cutler Mfg. Co..... 32

Davison Foundry Co..... 53
Dee, Wm. E., Co..... 48
DeLaval Steam Turbine Co..... 17
Diggs Fire Extinguisher Co..... 15
Dunning, W. D..... 44
Duquesne Fireproofing Co..... 47

East Ohio Sewer Pipe Co..... 46
Erie Machine Shops..... 42
Eureka Fire Hose Co..... 15
Ewing, Wm. B..... 31
Ewing-Merkle Electric Co..... 17
Explosives Mfg. Co..... 41

Fabric Fire Hose Co..... 60
Fanning, J. T..... 30
Firestone Tire & Rubber Co..... 14
Fox Brothers Co..... 6

Gamewell Fire Alarm Telegraph Co. 13
Glazier Universal Nozzle Co..... 16
Globe Asphalt Co..... 57
Gregory, Elisha..... 31

Hawkes, Thomas..... 32
Haywood Wagon Co..... 37
Hering, Rudolph, & Geo. W. Fuller 30
Hetherington & Berner..... 45
Howard, J. W..... 32
Hudson Eng'g & Cont'g Co..... 31
Hungarian-Derva Asphalt Co..... 57

Independence Rubber Co..... 10
Int. Fence & Fireproofing Co.... 53
Int. Sanitary Street Cleaner Co.. 5
Iowa Engineering Co..... 30

Keasbey Co., Robt. A..... 18
Kelly-Springfield Road Roller Co.. 43
Kuichling, Emil..... 30

Maslins 16
Meacham & Wright..... 53
Menzies Street Cleaner Co..... 7
Metropolitan Paving Brick Co.... 51
Monmouth Mining & Mfg. Co... 48
Morris Machine Works..... 16

Nashville Roofing & Paving Co... 44
National Drill & Mfg. Co..... 37
National Correspondence Institute. 9
National Pyrogranit Co..... 52
Neptune Meter Co..... 60
New England Steam Brick Co.... 50
New York Cent. & Hud. River R.R. 9

Okonite Co., Ltd..... 60

Pacific Flush Tank Co..... 18
Pierce Supply Co..... 49
Pittsburg-Buffalo Co. 47
Pittsburg Clay Products Co..... 51
Pittsburg Meter Co..... 18
Pneumatic Engineering Co..... 17
Pollard, J. G..... 32
Porter, James M..... 50
Purington Paving Brick Co..... 51

Regan & Mulock..... 30
Republic Chemical & Creosoting Co. 54
Robinson Clay Product Co..... 48

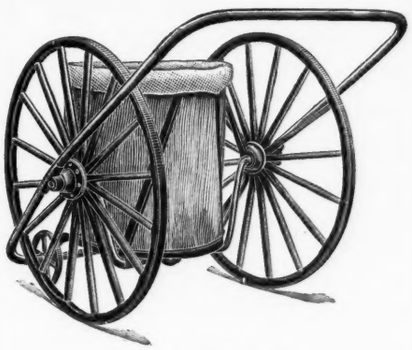
Sanitary Street Sweeping Co..... 7
Schellinger Bros. Co..... 55
Scherzer Rolling Lift Bridge Co.. 41
Scholl & Co., Julian..... 43
Seagrave Co., The..... 14
Shcott, W. H..... 31
Shadbolt Mfg. Co..... 37
Sheffield & Co., O. H..... 31
Southern Creosoting Co..... 40
Standard Firebrick Co..... 50
Standard Water Meter Co..... 18
Star Electric Co..... 13
Steel Highway Track Constr. Co... 56
Stratton Fire Clay Co..... 47
Stroud & Co., E. H..... 6
Studebaker Bros. Mfg. Co..... 39

Texas & Pacific Coal Co..... 52

U. S. Sanitary Co..... 53
U. S. Wood Preserving Co..... 55
Union Water Meter Co..... 18

Vulcan Iron Works..... 48

Wadsworth Stone & Paving Co.... 45
Warren Asphalt Paving Co..... 57
Warren Bros. Co..... 59
Warner, Chas. Co..... 53
Warren Bituminous Paving Co.... 53
Warren Construction Co..... 57
Watson Wagon Co..... 39
Western Brick Co..... 50
Willson & Co., H. B..... 32
Winget Concrete Machine Co.... 4
Winslow Voting Machine Co..... 4
Wirt & Knox Mfg. Co..... 7
Wise & Watson..... 30



CARRIER WITH SACK.

THE NEWEST AND BEST
CAN CARRIER

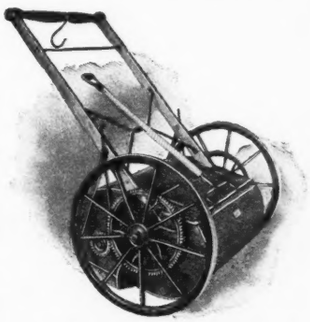
THE City of New York has just awarded, in open competition, a contract for three hundred of these can carriers. Full information upon request.

WIRT & KNOX MFG. COMPANY,
22 N. Fourth Street, ... PHILADELPHIA, PA.

CARRIER WITH CAN.

PEERLESS "PICK-UP"
HAND STREET SWEEPER

The Most Efficient and Economical Street Cleaning Apparatus Manufactured



The Louisiana Purchase Exposition Co. adopted this hand sweeper for sweeping the aisles of the buildings at the World's Fair at St. Louis, as well as for sweeping the streets within the grounds.

This machine saved the city of Washington, D. C., $15,647 in one year. Pays for itself in less than a year's time.

SANITARY STREET SWEEPING COMPANY
Virginia Ave. and 5th St., S. E. Washington, D. C.

THE MENZIES
STREET CLEANER

A workman can keep clean about fifty per cent. more street surface than by any other machine or contrivance, and will thus save the cost of the machine within a month or two. No shovel required. Refuse deposited in can with one motion. Machines are strong and neat. Will last for years.

Write us for further information.

MENZIES STREET CLEANER COMPANY
GLENS FALLS, NEW YORK

"Big Four"

Magnificent through train-service is maintained in connection with the Lake Shore, New York Central, Boston & Albany and other roads.

The Best Route to Cincinnati, St. Louis and the West.

Write for Folders.

Warren J. Lynch, General Passenger and Ticket Agent.
W. P. Deppe, Asst. General Passenger and Ticket Agent.
CINCINNATI, O.

Street-Cleaning

and the disposal of a city's wastes: methods and results and the effect upon public health, public morals, and municipal prosperity.

By George E. Waring, Jr.; pages, 230; price, $1.25.

Municipal Journal Publishing Company
253 Broadway, New York

THE MUNICIPAL JOURNAL AND ENGINEER

An illustrated magazine devoted to municipal affairs and published monthly at 253 Broadway, New York. Three dollars per year; twenty-five cents per copy. Make all remittances payable to The Municipal Journal Publishing Company

TABLE OF CONTENTS FOR DECEMBER, 1904

CONTRIBUTED ARTICLES

The Pole and Wire Nuisance..... 245
Charles Dwight Willard.

Portland Cement 249
E. Kuichling, C.E.

Municipal Taxation 254
Lawson Purdy.

Municipal Telephony in England..... 256
F. Dagger.

Septic Tank Sewage Disposal..... 258
Ex-Provost Shanks.

Fire Alarm Telephones 274
Adam Bosch.

GENERAL ARTICLES

Misdemeanors of Acetylene..... 252
Municipal Advertising 253
English Municipal Electric Lighting..... 261
Population, Valuation, Tax-Rate and Indebtedness of the Cities of Massachusetts, 1903.... 263
Purifying the Water Supply..... 270
Growing Use of Concrete..... 271
The Japanese Army Builds Good Roads..... 272

EDITORIAL

Commercial Value in Public Improvements..... 264
Necessity for Underground Wires..... 264
An Admirable Precedent 265
Protest Against Subway Signs..... 265
Editorial Comment 265

PERSONALITIES..... 266

CONVENTION DATES..... 267

NEWS AND PRACTICE AMONG THE CITIES

Proposed Improvements in New Orleans..... 257
Mayor Jones' City..... 262
Bitulithic Pavement in Springfield..... 268
The Lesson of the Melrose Disaster..... 269
A "Hospital Town" 270
Cleaning Rochester's Streets..... 271
Municipal Art in Hartford..... 271
Sanitary Value of Meters 271
New York's Notable Playground..... 272
Thawing Water Pipes by Electricity..... 272
Incidental Items of Interest..... 273

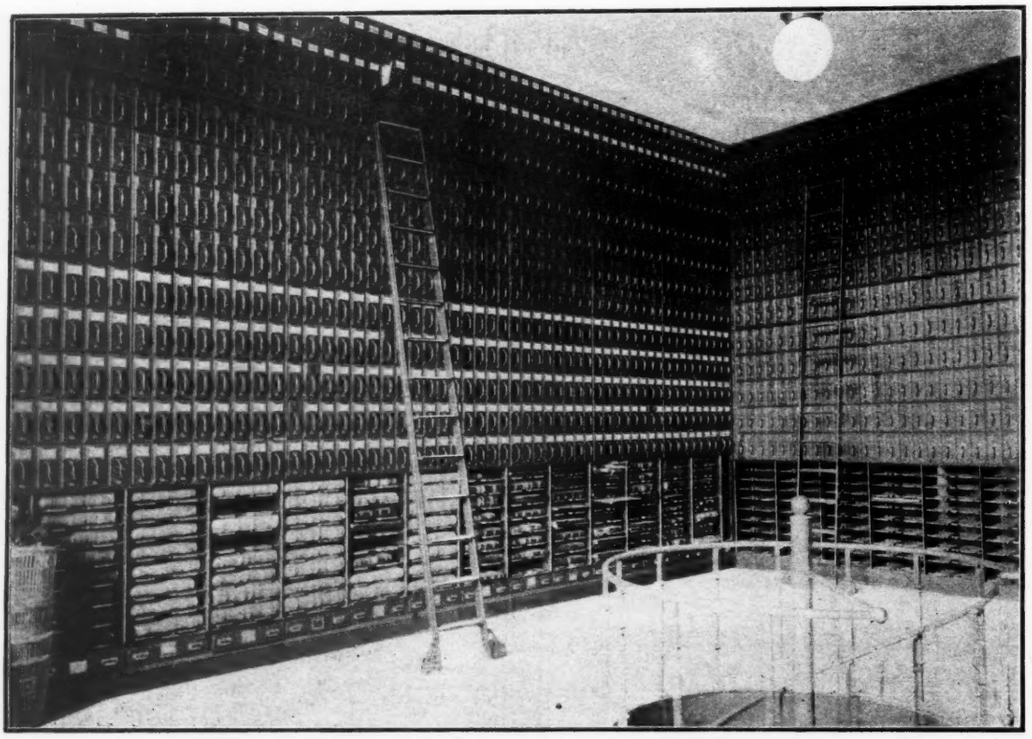
FIRE AND POLICE DEPARTMENT

Fire-Alarm Telephones 274
Adam Bosch.
Acetylene and Fire Insurance..... 275
Finger Prints and Tramps..... 276
A Gasoline Motor Fire Engine..... 277
The Janesville Fire Department..... 277
Police Chiefs in Convention 279
Fire and Police Personals 279

LITERATURE ON MUNICIPAL TOPICS.—BOOKS, AMERICAN PERIODICALS... 280

ITEMS OF INTEREST ABOUT THE TRADE

A Boon to Cleveland Shippers..... 282
Kentucky Rock Asphalt 283
Awards to the Westinghouse Companies..... 283
Coal Production and Kindred Industries..... 284
New Record for the "Central"..... 284
The Studebaker Prizes 284
Second Largest Water Power Equipment..... 284
300-Horse Power Steam Turbine Pump..... 285
Wanted: Chemical Extinguishers That Are Safe 285
Trade Publications Received 286
Items of Interest About the Trade..... 286
War on the Ticket Scalpers..... 286



METALLIC FIXTURES, CITY CLERK'S OFFICE, MINNEAPOLIS, MINN.

Send for Booklet 1202, Illustrating Metallic Devices. **ART METAL CONSTRUCTION CO., Jamestown, N. Y.**

Let's Speak Frankly

Those who think they can afford it, pay the "advertised price." Those who are not sure, investigate and calculate the cost. For example: take a typewriter,—$100 is the "standard price"—well advertised. Yet we all know there is not one hundred dollars worth of value in any machine provided equal merit can be had at a less price. Waste has no place in the scheme of success.

The Chicago -- $35

is the best machine at any price, and in purchasing it you save $65
Write for the reason why.

CHICAGO WRITING MACHINE CO.
94-96 WENDELL ST., CHICAGO, ILL.

Berger's Steel-Sects

JUST FIT YOUR OFFICE

Our Steel-Sects are built to protect office records. If wood was superior to steel in the matter of ***protection*** and ***indestructibility*** we would have made them of wood and called them "Wood-Sects." Our effort was to give the owner of valuable documents, records, etc., equipment that ***could not be destroyed*** through the action of the elements or invaded by pests. Steel is that material, that's why we selected it.

If makers of safes believed that wood affords the most protection in every way, they would not build safes of steel. Do you see the point?

We have published an interesting catalogue (No. 15) on ***Steel-Sects*** and ***Steel Office Furniture,*** which will interest every office man, professional man and business man. It's ***free*** for the asking. Wouldn't it be well for you to write us just now while you have this in mind? You will please us by writing for it.

Steel-Sects are made in units. The section bought now will fit any section purchased in the future.

The **BERGER MFG. CO., Canton, Ohio**

Steel Specialties: Ceilings, Roofing, Siding, Fireproofing, Steel Furniture.

Two Questions For You

ARE YOU A CITY EMPLOYE?

DO YOU SEEK PROMOTION?

SPECIAL TRAINING WILL INSURE IT

You can gain the necessary special training by devoting your leisure hours to study, in a few months, at home with but trifling expense.

IT'S THE MAN WITH BRAINS THAT WINS

Learn Municipal, Civil or Sanitary Engineering, Drafting, Stenography and Typewriting, Accounting, by Mail, and fit yourself for a higher position.

FREE REGISTRATION WITH HAPGOODS

is given with certificate of proficiency, which affords the best possible means of obtaining a higher grade position in any of these or other lines.

THE NATIONAL CORRESPONDENCE INSTITUTE

Courses will thoroughly fit you for practical work. Tell us the line of work you wish to follow and we will send you special literature concerning our course to fit you for it. Address:

NATIONAL CORRESPONDENCE INSTITUTE
2D NAT'L BANK BLDG., WASH., D. C.

Personally Conducted Tours to

CALIFORNIA

VIA THE

New York Central Lines

Will move at frequent intervals in December, January, February, March and May.

For particulars, inquire of ticket agents of the New York Central Lines, or enclose a two-cent stamp for a copy of "America's Winter Resorts," to George H. Daniels, General Passenger Agent, Grand Central Station, New York.

CLIMAX SIGN POSTS

Have no equal for endurance.
Cost ½ of any other post.

WHY ?

1 post on a corner answers for 2
1 lasts as long as any other 2

Made of galvanized pipe and casting set in vitrified shale clay base. Blue enameled signs with white letters.

They NEVER Wear Out

For quotations and other information address

CLIMAX SUPPLY CO.
712 Marquette Building, CHICAGO.

WE CONVEY AND ELEVATE EVERYTHING.
TACKS, SAND, ROCK, ORES, RED HOT IRON, MOLTON SLAG, COAL AND SALT.
CONVEYORS AND ELEVATORS MADE BY
THE C.O. BARTLETT & SNOW CO.
CLEVELAND. O.

RUBBER!

We are not indulging in slang, but simply calling the attention of **Public Officials, Engineers** and **Contractors** to the fact that if they need anything in the line of rubber goods, they will do well to write us. We give the **best** and the **most** for the **least money.**

Has your **Fire Hose** had long and hard service, and is it pretty well worn? **Delay** is **dangerous!** Get new! We have not only rubber fire hose, but carry the best makes of other materials.

There is nothing you may need for the **water works** that we haven't on hand: sheet packing, rubber and leather belting, acid and water hose, etc., etc.

Rubber Door Mats, both perforated and corrugated, and rubber safety step treads we make a specialty of. Prompt delivery. Write for prices.

INDEPENDENCE RUBBER COMPANY

Charles H. Dougherty, 2d, Pres. and Gen'l Manager **11 North Juniper Street, Philadelphia**

"THE ONLY WAY"

BETWEEN
CHICAGO
ST. LOUIS
KANSAS CITY
AND
PEORIA

Handsomest, most luxurious trains in the world; completely rock-ballasted road-bed, no dust, no dirt, no smoke, no cinders.

THE ALTON'S 1905 GYPSY GIRL

Copyright, 1904, by the Chicago & Alton Railway Co.

Sequel to the famous "Fencing" and "Cow-Boy" Girl Art Calendars.

ART CALENDAR

FIVE SHEETS, EACH 10 X 15 INCHES

SEND 25 CTS.

with name of publication in which you read this advertisement, to GEO. J. CHARLTON, General Passenger Agent, Chicago & Alton Railway, Lock Box 618 CHICAGO, ILL., and get the handsomest calendar of the year. Four graceful poses in colors, unmarred by advertisements and ready for framing.

MANUFACTURERS

Contemplating establishing plants in the West should take advantage of a location on

THE NORTH-WESTERN LINE

Chicago & North-Western Ry.

which reaches the famous

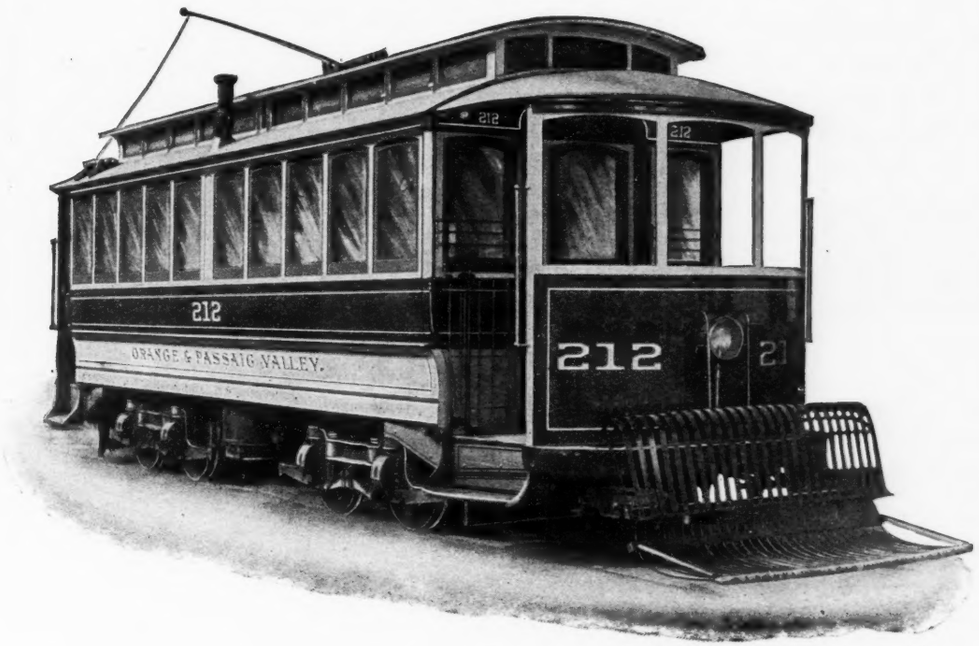
WATER POWERS,
COAL FIELDS,
IRON ORE RANGES,
HARD AND SOFT LUMBER DISTRICTS

of the West and Northwest, and affords the best means of transportation to the markets of the world.

FOR FURTHER PARTICULARS APPLY TO

MARVIN HUGHITT, Jr., *Freight Traffic Mgr.,* **E. D. BRIGHAM,** *Gen'l Freight Agent,*
CHICAGO.

CAR FENDERS



OUR NEW MODEL "C" CAR FENDER

If what we claim for the "**PROVIDENCE**" Fender as a Life Saver is true, it should be attached to every Electric Car.

If what we claim is not true, why is it that over 250 Electric Roads are equipped with this fender, and that there are more than 17,000 "PROVIDENCE" FENDERS IN DAILY USE?

The Consolidated Car Fender Co.

39-41 Cortlandt Street

New York

THE MUNICIPAL JOURNAL AND ENGINEER
BUSINESS DIRECTORY

For those seeking Material, Machinery or Special Service for Municipal or Public Work. The names in this List are considered the Leaders in their respective lines. An index to their advertisements on page 6. If you fail to find what you are looking for write to us.

Air Compressors.
Pneumatic Engineering Co.

Air Lift Systems.
Hudson Eng'g & Cont'g Co.
Pneumatic Engineering Co.

Artesian Wells and Machinery.
Gregory, Elisha.
Hudson Eng'g & Cont'g Co.
National Drill & Mfg. Co.

Artificial Stone Machinery.
Winget Concrete Machine Co.

Artificial Stone Sidewalks.
Central Bitulithic Paving Co.
Nashville Roofing & Paving Co.
Warren Bituminous Paving Co.
Warren Brothers Co.

Asphalt.
Barber Asphalt Paving Co.
Byerley & Son.
Globe Asphalt Co.
Hungarian-Derna Asphalt Co.
Wadsworth Stone & Paving Co.
Warren Asphalt Paving Co.

Asphalt Paving.
Barber Asphalt Paving Co.
Warren Asphalt Paving Co.

Asphalt Paving Plants.
Hetherington & Berner.
Wadsworth Stone & Paving Co.
Warren Asphalt Paving Co.

Asphalt Rollers.
American Road Roller Co.
Austin Mfg. Co.
Buffalo Steam Roller Co.
Continental Ry. Equip. Co.
Contractors Tool Co.
Erie Machine Shops.
Kelly Springfield Rd. Roller Co.
Scholl & Co., Julian.

Asphalt Sidewalks.
Central Bitulithic Paving Co.
Nashville Roofing & Paving Co.
Warren Bituminous Paving Co.
Warren Asphalt Paving Co.

Asphalt Tools and Machinery.
Anderson, W. H., & Sons.
Scholl & Co., Julian.
Wadsworth Stone & Paving Co.

Automobile Street Sweeper.
Int. Sanitary St. Cleaner Co.

Bitulithic Pavement.
Central Bitulithic Paving Co.
Nashville Roofing & Paving Co.
Warren Bituminous Paving Co.
Warren Brothers Co.

Boiler and Pipe Coverings.
Keasbey, Robt. A.

Brick Holder.
Pierce Supply Co.

Brick, Paving, Building and Sewer.
American Sewer Pipe Co.
Barr Clay Co.
Bessemer Limestone Co.
Buffalo Clay Mfg. Co.
Clearfield Clay Working Co.
Cleveland Brick Co.
Clinton Paving Brick Co.
Collinwood Shale Brick Co.
East Ohio Sewer Pipe Co.
Metropolitan Paving Brick Co.
National Pyrogranit Co.
New England Steam Brick Co.
Pittsburg & Buffalo Co.
Pittsburgh Clay Products Co.
Porter, James M.
Purington Paving Brick Co.
Robinson Clay Product Co.
Standard Fire Brick Co.
Texas & Pacific Coal Co.
Western Brick Co.

Bridges.
Climax Road Mach'y Co.
Scherzer Rolling Lift Bridge Co.

Car Fenders.
Consolidated Car Fender Co.

Carriers, Can and Bag.
American Road Roller Co.
Fox Brothers Co.
Wirt & Knox Mfg. Co.

Castings.
Davison Foundry Co.
Pierce Supply Co.
Vulcan Iron Works Co.

Cement.
Meacham & Wright.
Robinson Clay Product Co.
Warner Co., Chas.
Warren Brothers Co.

Cement Machinery.
W. D. Dunning.

Centrifugal Pumps.
Wm. H. Cook & Co.
DeLaval Steam Turbine Co.
Morris Machine Works.

Chemical Engines.
American-La France Fire Engine Co.
Diggs Fire Extinguisher Co.

Coal Dust Burner.
Bartlett & Snow Co., C. O.

Coal Tar.
Nashville Roofing & Paving Co.
Warren Brothers Co.

Concrete Block Machinery.
Winget Concrete Machine Co.

Concrete Mixers.
Anderson, W. H., & Sons.
Scholl & Co., Julian.

Concrete Structural Work.
Int. Fence & Fireproofing Co.
Schillinger Bros. Co
Warren Brothers Co.

Conduits.
Pittsburgh Clay Products Co.
Regan & Mulock.

Contractors. (See Engineers.)

Contractors' Supplies and Machinery.
Acme Road Machinery Co.
Anderson, W. H., & Sons.
Austin Mfg. Co.
Climax Road Machinery Co.
Continental Ry. Equip. Co.
Contractors' Equipment Co.
Jos. G. Pollard.
Maslins & Sons, John.
National Drill & Mfg. Co.
Scholl & Co., Julian.
Vulcan Iron Works.

Conveyors and Elevators.
Bartlett, C. O., & Snow Co.

Covers, Manhole, Catch Basin and Inlet.
Davison Foundry Co.
Pierce Supply Co.

Creosoted Wood.
Republic Chemical & Creosoting Co.
Southern Creosoting Co.
U. S. Wood Preserving Co.

Curbing.
American Sewer Pipe Co.
East Ohio Sewer Pipe Co.

Ditching, Dredging and Excavating Machinery.
Vulcan Iron Works Co.

Drain Tile.
Wm. E. Dee Co.

Dredging.
Atlantic, Gulf & Pacific Co.

Dump Wagons. (See Wagons.)

Earth Handling Machinery.
Austin Mfg. Co.
National Drill & Mfg. Co.

Electrical Apparatus and Supplies.
Ewing Merkle Electric Co.

Engineers, Civil, Consulting and Constructing.
Alvord, John W.
Brossman & King.
Caird, Jas. M.
Child, Stephen.
City Wastes Disposal Co.
Ewing, Wm. B.
Fanning, J. T.
Hawkes, Thomas I.
Hering, Rudolph, & Geo. W. Fuller.
Howard, J. W.
Hudson Eng'g & Cont'g Co.
Iowa Engineering Co.
Kuichling, Emil.
Perkins, Frank C.
Regan & Mulock.
Schott, W. H.
Smead, I. D.
Sheffield & Co., O. H.
Wise & Watson.

Explosives.
Explosives Mfg. Co., The

Fencing and Railings.
Int. Fence & Fireproofing Co.

Filing Devices.
Art Metal Construction Co.
Berger Mfg. Co.

Fence Posts.
Climax Supply Co.

Fire Alarm Systems.
Gamewell Fire Alarm Telegraph Co.
Star Electric Co.

Fire Brick and Clay.
Wm. E. Dee Co.

Fire Department Supplies.
American-La France Fire Engine Co.
Diggs Fire Extinguisher Co.
Fabric Fire Hose Co.
Glazier Nozzle & Mfg. Co.
Seagrave Co., The.

Fire Extinguishers.
American-La France Fire Engine Co.
Diggs Fire Extinguisher Co.

Fire Hose.
Eureka Fire Hose Co.
Fabric Fire Hose Co.
Independence Rubber Co.

Fire Hose Nozzles.
Glazier Nozzle & Mfg. Co.

Fireproof Construction.
Berger Mfg. Co.
Duquesne Fireproofing Co.
Int. Fence & Fireproofing Co.

Flue Lining.
Wm. E. Dee Co.

Flush Tanks.
Pacific Flush Tank Co.

Garbage Disposal Plants
Clinton Foundry & Machine Co.

Hoisting Engines.
Continental Ry. Equip. Co.

Inspector of Iron and Steel.
Conard, W. R.

Lamps, Arc and Incandescent.
Ewing Merkle Electric Co.

Landscape Architects.
Child, Stephen.

Lift Bridges.
Scherzer Rolling Lift Bridge Co.

Lighting Systems.
Auto. Inc. Light Co.
Cleveland Vapor Light Co.

Mail Chutes.
Cutler Mfg. Co.

Metal Furniture.
Art Metal Construction Co.
Berger Mfg. Co.

Meter Testing Apparatus.
Pittsburg Meter Co.

Patents.
Willson & Co., H. B.

BUSINESS DIRECTORY

Continued from opposite page.

Paving and Paving Materials.
American Sewer Pipe Co.
Barber Asphalt Paving Co.
Barr Clay Co.
Bessemer Limestone Co.
Buffalo Clay Mfg. Co.
Byerley & Son.
Central Bitulithic Paving Co.
Clearfield Clay Working Co.
Cleveland Brick Co.
Clinton Faving Brick Co.
Collinwood Shale Brick Co.
East Ohio Sewer Pipe Co.
Globe Asphalt Co.
Hungarian-Derna Asphalt Co.
Metropolitan Paving Brick Co.
Nashville Roofing & Paving Co.
National Pyrogranit Co.
New England Steam Brick Co.
Pittsburg & Buffalo Co.
Pittsburgh Clay Products Co.
Porter, James M.
Purington Paving Brick Co.
Republic Chemical & Creosoting Co.
Robinson Clay Products Co.
Schillinger Bros. Co.
Standard Fire Brick Co.
Steel Highway Track Const'n Co.
Texas & Pacific Coal Co.
U. S. Wood Preserving Co.
Wadsworth Stone & Paving Co.
Warren Asphalt Paving Co.
Warren Bituminous Paving Co.
Warren Bros. Co.
Western Brick Co.

Paving Tools.
Anderson, W. H., & Sons.

Pipe.
Central Foundry Co.

Pneumatic Pumps.
Pneumatic Engineering Co.

Portable Asphalt Plants.
Hetherington & Berner.
Wadsworth Stone & Paving Co.

Rail Block.
Arthur, W. H.

Road Machinery.
Acme Road Machinery Co.
American Road Roller Co.
Austin Mfg. Co.
Climax Road Machinery Co.
Continental Ry. Equip. Co.
National Drill & Mfg. Co.
Scholl & Co., J.
Vulcan Iron Works Co.

Road Rollers.
American Road Roller Co.
Austin Mfg. Co.
Buffalo Steam Roller Co.
Climax Road Machinery Co.
Continental Ry. Equip. Co.
Erie Machine Shops.
Kelly-Springfield Rd. Roller Co.
National Drill & Mfg. Co.
Scholl & Co., Julian.

Rock Crushers.
Acme Road Machinery Co.
American Road Roller Co.
Austin Mfg. Co.
Climax Road Machinery Co.
National Drill & Mfg. Co.
Scholl & Co., J.

Roofing and Roofing Material.
Barber Asphalt Paving Co.
Nashville Roofing & Paving Co.
Warren Brothers Co.

Rubber Tires
Firestone Tire & Rubber Co.

Scrapers, Wheeled and Drag.
Acme Road Machinery Co.
Austin Mfg. Co.
Climax Road Machinery Co.
National Drill & Mfg. Co.

Sewage Disposal.
Cameron Septic Tank Co.
City Wastes Disposal Co.

Sewer Cleaning Machine.
Connolly, M. T.

Sewage Pumps.
Wm. H. Cook & Co.
DeLaval Steam Turbine Co.
Morris Machine Works.
Pneumatic Engineering Co.

Sewer Pipe.
American Sewer Pipe Co.
Wm. E. Dee Co.
Duquesne Fireproofing Co.
East Ohio Sewer Pipe Co.
Monmouth Mining & Mfg. Co.
Pittsburg & Buffalo Co.
Pittsburgh Clay Products Co.
Porter, James M.
Robinson Clay Product Co.
Stratton Fire Clay Co.

Sign Posts.
Climax Supply Co.

Steam Fire Engines.
American-La France Fire Engine Co.

Steam Shovels.
Vulcan Iron Works.

Steel Highway Track,
Steel Highway Track Const'n Co.

Street Cleaners.
Menzies Street Cleaner Co.
Sanitary Street Sweeping Co.
Stroud & Co., E. H.

Street Lamps and Lighting.
Automatic Inc. Light Co.
Cleveland Vapor Light Co.

Street Sprinklers.
Austin Mfg. Co.
Studebaker Bros. Mfg. Co.

Street Sweepers.
American Road Roller Co.
Austin Mfg. Co.
Kelly Springfield Rd. Roller Co.
Int. Sanitary St. Cleaner Co.
Sanitary Street Sweeping Co.
Shadbolt Mfg. Co.
E. H. Stroud & Co.
Studebaker Bros. Mfg. Co.

Switchboards, Fire Alarm and Police Telegraph.
Gamewell Fire Alarm Teleg. Co.
Star Electric Co.

Traction Engines and Road Locomotives.
American Road Roller Co.
Buffalo Pitts Co.
Buffalo Steam Roller Co.

Trench Machines.
Vulcan Iron Works Co.

Turbine Engines and Pumps.
DeLaval Steam Turbine Co.

Voting Machines.
Winslow Voting Machine Co.

Wagons and Carts.
Austin Mfg. Co.
Climax Road Mch'y Co.
Columbia Wagon Co.
National Drill & Mfg. Co.
Shadbolt Mfg. Co.
Studebaker Bros. Mfg. Co.
U. S. Sanitary Co.
Watson Wagon Co.

Water Analysis.
Caird, Jas. M.

Water Meters.
Buffalo Meter Co.
Neptune Meter Co.
Pittsburg Meter Co.
Standard Water Meter Co.
Union Water Meter Co.

Well Machinery.
Austin Mfg. Co.

Wheelbarrows.
Anderson, W. H., & Sons.

Wires and Cables.
Okonite Co.

Wooden Pavements.
Republic Chemical & Creosoting Co.
U. S. Wood Preserving Co.

THE GAMEWELL FIRE ALARM TELEGRAPH CO.

FIRE ALARM TELEGRAPH SYSTEMS	POLICE SIGNAL TELEGRAPH	AUXILIARY ALARM SYSTEMS

General Offices: 19 Barclay Street, NEW YORK

FIRE ALARM TELEGRAPH APPARATUS and SYSTEMS

RELIABLE AND STRICTLY UP-TO-DATE

Let us tell you how your system can be made more perfect and RUNNING EXPENSES REDUCED.

DO NOT BUY OLD-FASHIONED, OUT-OF-DATE FIRE ALARMS

STAR ELECTRIC COMPANY

BINGHAMTON, N. Y.

N. B.—Don't forget our **Storage Battery System.** We have the best.

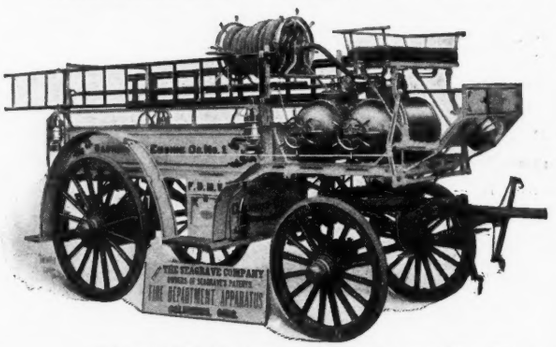
THE SEAGRAVE COMPANY

MANUFACTURERS OF

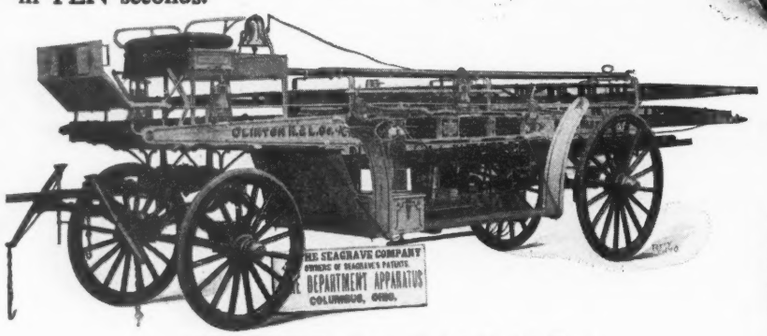
Fire Apparatus, Trussed Ladders and Equipments, Etc.

COLUMBUS, OHIO, U. S. A.

The Seagrave Company's Aerial Ladder has passed the experimental stage, and is now universally recognized as the best Aerial yet produced. It is the only ladder that can be hoisted and extended to full length by TWO men in TEN seconds.



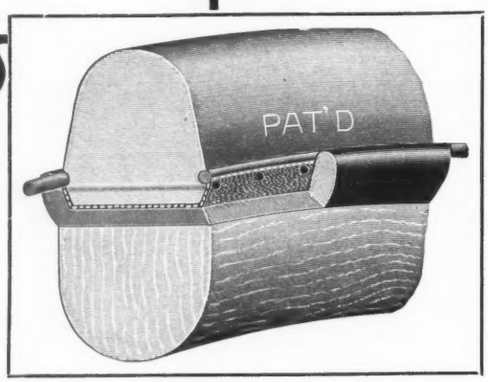
SEAGRAVE Combination Chemical Engine and Hose Wagon.



A SEAGRAVE City Service Hook and Ladder Truck.

Not Members of any Trust.

City and Village Councils and purchasing committees are hereby cautioned that all purchasers or manufacturers of infringements on any of our Foreign and United States Patents on Trussed Ladders and Equipments are alike liable to the Patentee for damages.



RECENT ORDERS HAVE BEEN RECEIVED FROM

New York	Harrisonburg, Va.	Galesburg
Boston	Chicago	St. Louis
Trenton, N. J.	Atlanta, Ga.	Duluth
Paterson, N. J.	Louisville, Ky.	Detroit
Newark, N. J.	Syracuse, N. Y.	Omaha
Lynn, Mass.	Minneapolis	Elgin
Scranton, Pa.	Milwaukee	Indianapolis
Meadville, Pa.	Fon du Lac	Muncie, Ind.
Reading, Pa.	Sheboygan	Terre Haute
Rochester, N. Y.	Sioux Falls	Newport, Ky.
Montclair, N. J.	Davenport	

FIRESTONE

SIDE-WIRE RUBBER TIRES

Have become the Standard for all Fire Department Apparatus

Because : : : : : : : :

They are constructed to withstand the severe strain of department work. They remain solid in the channel, under every condition. Do not roll when swinging corners. Their use reduces maintenance expense, increases efficiency and decreases the liability of accidents.

FOR INFORMATION WRITE

Firestone Tire & Rubber Co.,

AKRON, OHIO

Trade Mark

Eureka Fire Hose Company,

No. 13 Barclay Street, NEW YORK.

The Original and Largest Manufacturers of

RUBBER LINED COTTON HOSE,

Sole Manufacturers of the Celebrated High Grade Brands of Seamless Woven Cotton, Mildew Proof and Rubber Lined

FIRE DEPARTMENT HOSE,

"Eureka." (4-ply.) **"Paragon."** (3-ply.) **"Red Cross."** (2-ply.)

Manufacturers of Hose of Every Description.

JACKET FIRE HOSE IN KNITTED OR WOVEN FORM.

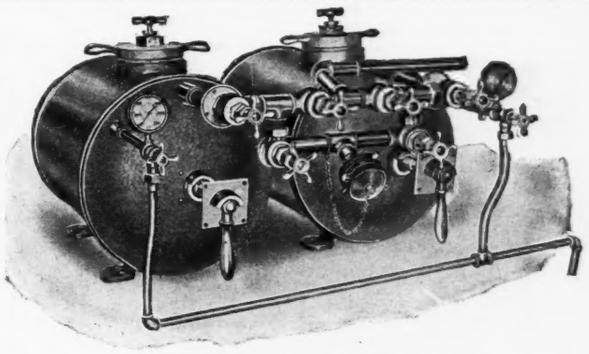
Automobile and Yacht

Diggs Engines and Extinguishers

The best material and best workmanship obtainable. Everything tested and guaranteed.

DIGGS FIRE EXTINGUISHER COMPANY

141-3 CENTRE STREET - - - - NEW YORK


Double Cylinder Engine Hammered Copper

THE LARGEST FIRE APPARATUS PLANTS IN THE WORLD

ELMIRA, N. Y. **SENECA FALLS, N. Y.** **CINCINNATI, O.**

BUILDERS OF

Fire Engines	Water Towers	Hook and Ladder Trucks
METROPOLITAN	HALE WATER TOWER	HAYES AERIAL
LA FRANCE	CHAMPION WATER TOWER	BABCOCK AERIAL
AMOSKEAG		DEDERICK AERIAL
CLAPP & JONES		KAISER AUTOMATIC
SILSBY		LA FRANCE AERIAL
COSMOPOLITAN		

Miscellaneous Fire Fighting Specialties

AUTOMATIC and HORSE DRAUGHT CHEMICAL HOSE WAGONS, FIRE EXTINGUISHERS, HOSE CARTS, SEARCH LIGHT ENGINES, CHEMICAL ENGINES, LADDERS, TURRET NOZZLES, GONGS, FIRE PAILS, AXES, PIKE POLES, Etc., Etc.

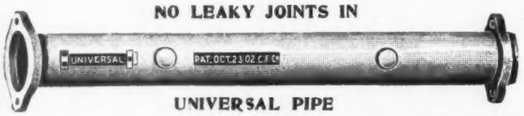
FOUNDED IN 1845. AMERICAN FIRE ENGINES LAFRANCE CINCINNATI, OHIO. ELMIRA, N.Y. SENECA FALLS, N.Y.

AMERICAN-LAFRANCE FIRE ENGINE CO.

ELMIRA, N. Y.

BRANCHES { **NEW YORK** 20 WARREN ST. **BOSTON** 294 WASHINGTON ST. **BALTIMORE** 424 SARATOGA ST. **CHICAGO** 373 WABASH AVE.

NO LEAKY JOINTS IN



UNIVERSAL PIPE

GAS MAINS—High and Low Pressure—**WATER MAINS**

CENTRAL FOUNDRY CO., 116N Nassau St., New York

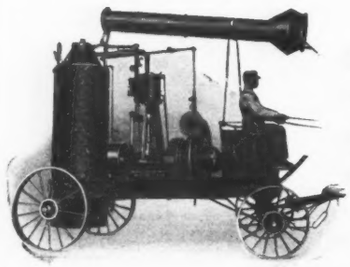
Contractors'
Drainage
Sewerage

PUMPS

Handling Dirty, Gritty and Sandy Liquids without Wear, Oil or Care. Pumping Outfits for Contractors, Mining, Irrigating, Railroad, Quarry, Drainage and Manufacturing purposes. Second-hand Engines, Boilers, Pumps and other Machinery always on hand. Exchanging.

MASLINS, - 165-167 First Street, Jersey City, N. J.

PUMPS FOR SEWAGE AND GARBAGE DISPOSAL



Mounted Centrifugal Pumps

for pumping out flooded cellars, etc.

Morris Machine Wks.

BALDWINSVILLE, N. Y.

NEW YORK OFFICE

39-41 CORTLANDT STREET.

HENION & HUBBELL, AGENTS

150 North Jefferson St, Chicago, Ill

"WILL NEITHER LEAK NOR LOCK"

Is Always Ready—Never Fails

THE

GLAZIER NOZZLE

Is the Greatest Improvement ever made in Fire Nozzles or Nozzle Systems.

It will remain in position without the use of holders, jacks or stay lines, and will work as well if let alone as when attended either at the end of the hose lines or on wheels.

The only Nozzle that combines Safety and Efficiency with large streams.

NO DEPARTMENT COMPLETE
WITHOUT THE GLAZIER NOZZLE

Write us for further information.

The Glazier Nozzle & Mfg. Co.

NEW YORK **INDIANAPOLIS**

BRADLEY & MUNSON, Incorporated

General Agents

99 Warren Street, New York

IN A CLASS BY ITSELF

BROOKS CENTRIFUGAL PUMP

BEST MUNICIPAL PUMP MADE.

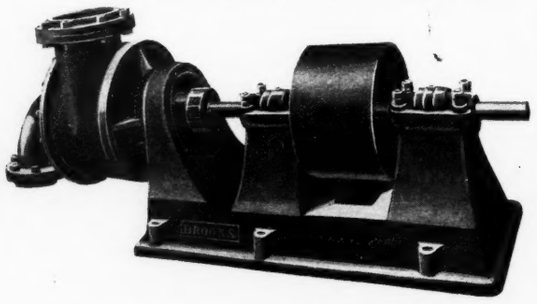
Our Guaranty

GREATEST VACUUM (28½ in.)

GREATEST PRESSURE (60 lbs.)

GREATEST EFFICIENCY

Of any Centrifugal Pump in the World



8 INCH PUMP

CAPACITY, 120,000 GALLONS PER HOUR
WEIGHT 1200 LBS. SUCTION 31 FT.
PRESSURE 60 POUNDS
2 STAGE COMPOUND 105 POUNDS

We make Pumps of all sizes and to meet all conditions

Manufactured Exclusively by

Wm. H. Cook & Co.

MONADNOCK BUILDING

CHICAGO, ILL.

WE CAN PUMP YOUR LIMIT

Our Systems of Pumping Water by Compressed Air are suitable for large cities of several millions of inhabitants, like

NEW YORK

and also for small towns of only a few thousand population, like

Eutaw, Alabama.

We can refer to towns and cities in *any part* of the U. S. A.

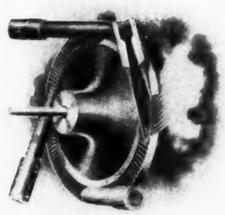
ESTIMATES FURNISHED WITHOUT CHARGE

We furnish references from Municipalities.

MONADNOCK BLOCK CHICAGO ILL. PNEUMATIC ENGINEERING CO. 128 BROADWAY, N.Y. LINCOLN TRUST BLDG ST. LOUIS MO.

We furnish references from Manufacturers.

DE LAVAL

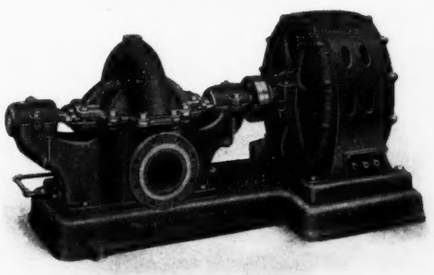


MANUFACTURERS OF

Steam Turbine Motors
Steam Turbine Generators
Steam Turbine Centrifugal Pumps
Steam Turbine Blowers
Electro-Motor Centrifugal Pumps

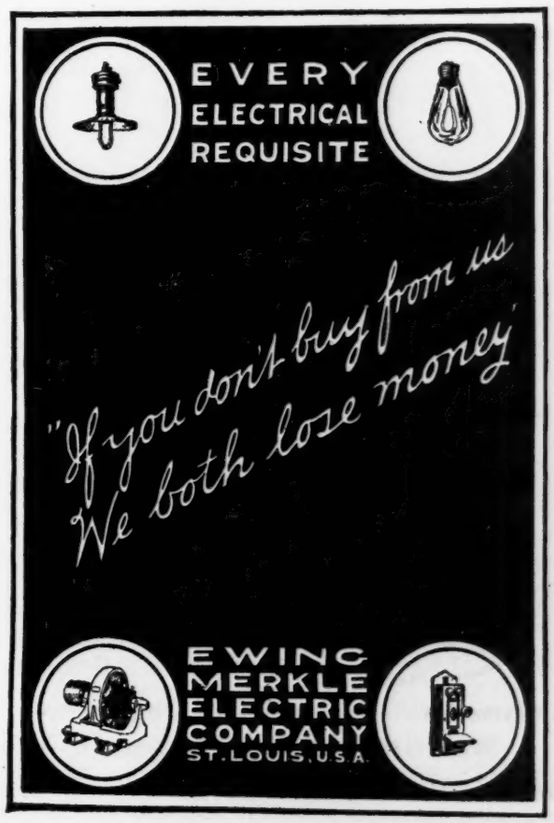
TRADE MARK

De Laval Centrifugal Pumps, both Steam Turbine and Electric Motor driven, are especially adapted for City Pumping Stations.
Write for catalogue.



300 H. P. A. C. ELECTRO-MOTOR PUMP

DE LAVAL STEAM TURBINE CO.
Trenton, N. J.



THE LOUISIANA PURCHASE EXPOSITION

has conferred the highest award

A GOLD MEDAL

on the

PITTSBURG METER COMPANY, EAST PITTSBURG, PA.

for the superior excellence of their

KEYSTONE WATER METERS and WESTINGHOUSE GAS METERS

Awarded the GOLD MEDAL at the Pan-American Exposition.

UNION WATER METER COMPANY,

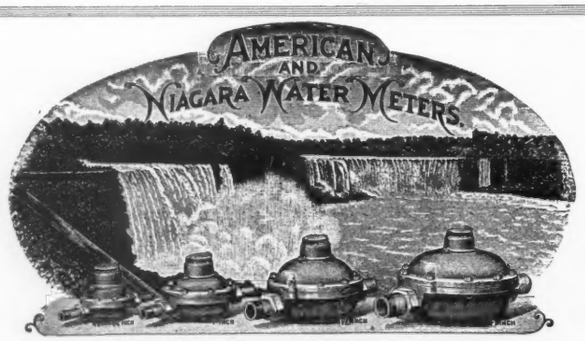
WORCESTER, MASS.

MANUFACTURERS OF **WATER METERS**

RECIPROCATING PISTON, ROTATING PISTON AND DISC PATTERNS.

Also Steam Fire Alarm Gongs, Chronometer Governor Valves, Corporations, Curb and Waste Stops, etc., etc.

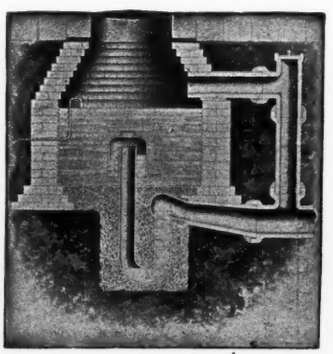
SEND FOR CIRCULAR AND PRICE LISTS.



BUFFALO METER CO.,

290 TERRACE, BUFFALO, N. Y.

Over 50,000 in Use.



MILLER

Automatic Siphon

FOR

Intermittent Flush Tanks.

For Flushing Street Sewers and for Sub-Soil Irrigation.
No Moving Parts. No Valves. No Small Tubes to Clog or Choke, Nothing Whatever to Get Out of Order.

Pacific Flush Tank Co.

Eastern Agency, 120 Liberty St., N. Y. **84 La Salle St., CHICAGO.**

Crown Sanitary Flooring

TRADE MARK

Lith Wall and Floor Insulation,

Fibre Felt and Rock Fibre Wool Deadening

Asbestos Building Papers, Roofing and Mineral Wool

ROBERT A. KEASBEY CO., 100 N. Moore St., New York
56, 58 PEARL ST, BUFFALO.

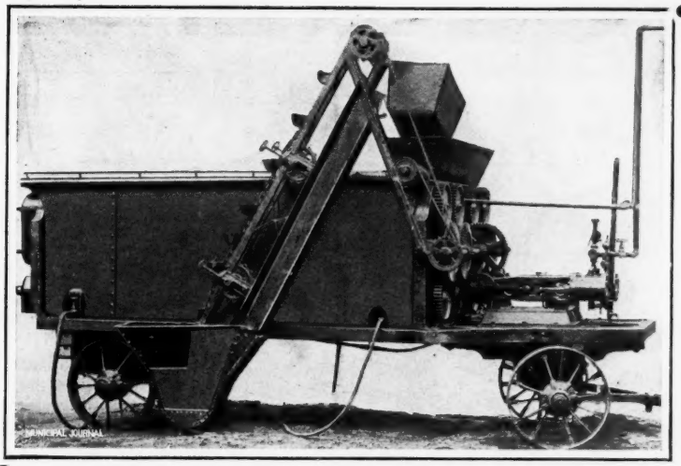
Water Meters

For Hot or Cold Water, Oil and other liquids—*All sizes*

Standard Water Meter Company

245 - 249 Robinson Street

Brooklyn, N. Y.



KENTUCKY ROCK ASPHALT

brought to perfection by the use of this Machine, requiring no additional materials, which invention simplifies Asphalt Paving for new streets or repairing.

This method, on account of its simplicity and convenience, in connection with the quality of work secured, should appeal to every City Municipality.

It is portable and inexpensive. No so-called Experts are required.

Samples and additional information cheerfully furnished to Engineers and Contractors.

"Standard"

Kentucky Natural Rock Asphalt Mastic is positively superior to any foreign Rock Asphalt Mastic for Brewery or Stable floors, or where Water-tight floors are required.

The WADSWORTH STONE & PAVING COMPANY, Main Office, 411 Trademen's Building,

NEW YORK OFFICE, 32 Broadway. PITTSBURG, PA. MINES, PITTSBURG LANDING, Green River, Ky.

PLANTS

FOR THE MANUFACTURE OF

Asphalt Streets

THE HETHERINGTON

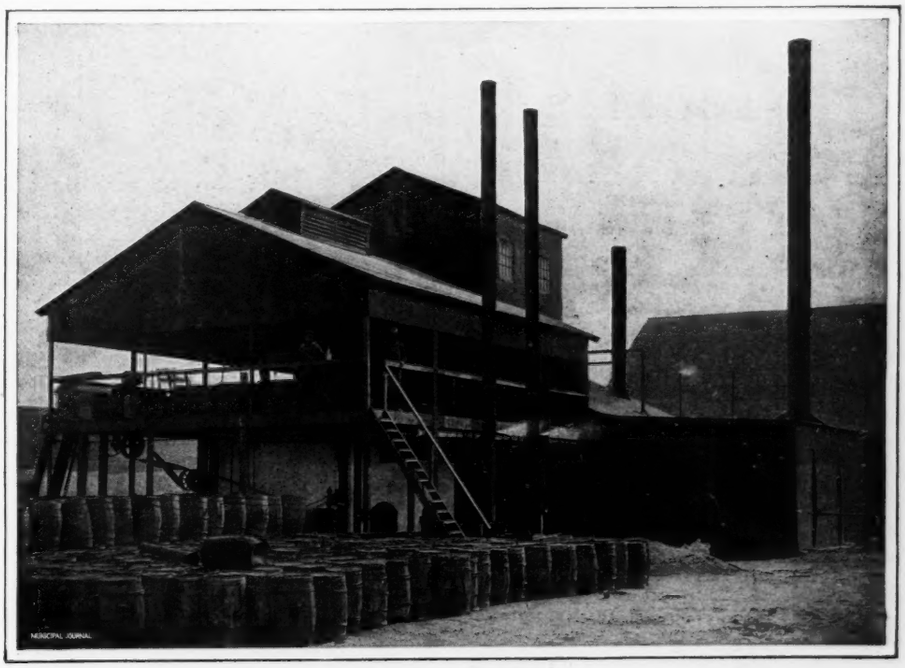
"Municipal,"

"Semi-Portable,"

AND

"Rail-way"

These plants have no equals and represent the latest and best methods.



THE "MUNICIPAL."

WE INSTALL PLANTS IN ANY PART OF THE WORLD, COMPLETE AND READY FOR SERVICE.

HETHERINGTON AND BERNER, Indianapolis, Indiana, U. S. A.

THE EAST OHIO SEWER PIPE COMPANY,

MANUFACTURERS OF

SEWER PIPE AND OTHER CLAY PRODUCTS.

IRONDALE, OHIO.

Double Strength Culvert Pipe

15 INCHES TO 36 INCHES FOR

Deep Sewers and Water Conduits

.. ALSO ..

Standard Ohio Sewer Pipe

3 INCHES TO 36 INCHES
WITH STANDARD
DEEP AND WIDE
SOCKETS
IN 2 FEET, 2½ FEET AND
3 FEET LENGTHS

Flue Linings
Wall Copings
PAVING BRICK
Fire Brick
Fire Clay

ELECTRIC CONDUITS

... AND ...

ALL OTHER CLAY PRODUCTS

ANNUAL CAPACITY

5,000 CAR LOADS

C. M. STRATTON H. E. STRATTON

A ON THE STRATTON FIRE CLAY CO.

MANUFACTURERS OF

HIGH GRADE SEWER PIPE

One of the Largest and Best Equipped Plants in the World

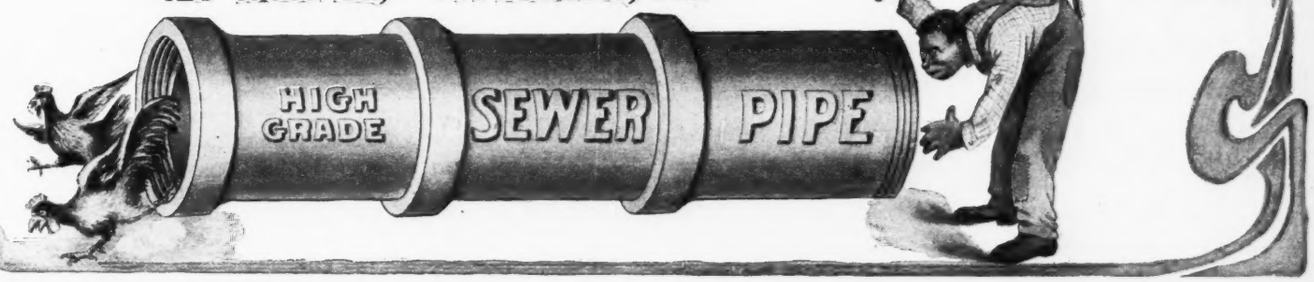
EMPIRE, ... OHIO

NOT IDENTIFIED WITH ANY TRUST

DUQUESNE FIREPROOFING CO.

Bell Tel. 2049 Court

421 Wood St., PITTSBURG, PA.

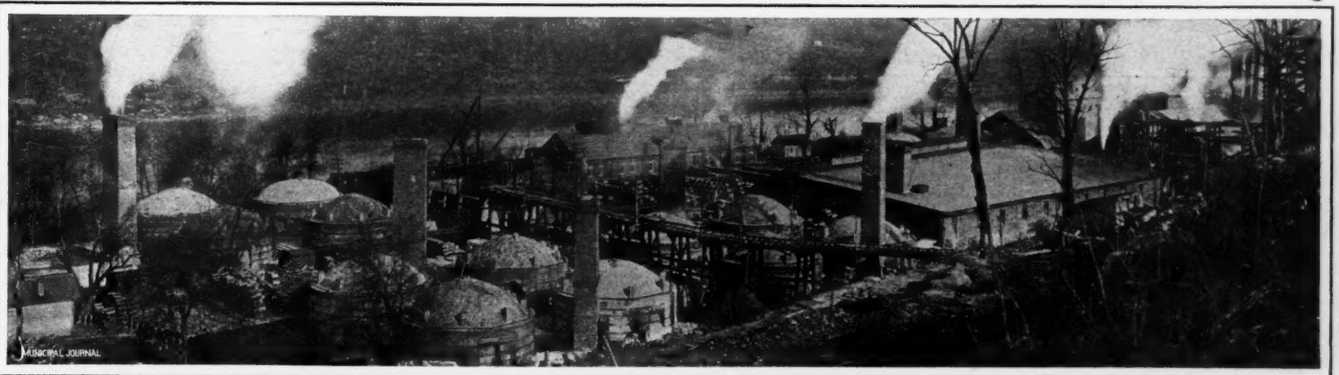


PITTSBURG-BUFFALO COMPANY

GENERAL OFFICES, FRICK BUILDING, PITTSBURG, PA.

MINERS, MANUFACTURERS AND SHIPPERS OF

COAL, BRICK, SEWER PIPE AND HOLLOW BLOCK



SEWER PIPE, BRICK AND HOLLOW BLOCK WORKS, JOHNETTA, PA., WHITE ROCK STATION

ANNUAL CAPACITY, BRICK 10,000,000, SEWER PIPE 1,500,000 FT., HOLLOW BLOCK 500,000

Largest Independent Coal Producers in Pittsburg District

ROBINSON CLAY PRODUCT CO.
AKRON, O.

7 PLANTS
Capacity 1000 Cars per Month

Branches

Flat Iron Building, New York
Eastern Clay Goods Co.
65 Oliver St., Boston
N. A. Williams Co.
Chamber of Commerce, Chicago

PAVING BRICK

PORTLAND CEMENTS

Monmouth Mining and Mfg. Co.

Manufacturers of

Well Pipe
Flue Lining
Wall Coping
Fire Brick
Fire Clay and
Farm Drain Tile

MONMOUTH, ILLINOIS

WM. E. DEE CO.,

Manufacturers of

Vitrified Sewer Pipe,

Drain Tile
Wall Coping
Flue Lining
Fire Brick
and Clay

Largest Output in the West

TWO PLANTS

Office
214-215 Royal Insurance Building
CHICAGO

Works
Mecca, Parke County
INDIANA

Connolly's Sewer Cleaning Device in actual operation in First St., Hoboken, New Jersey.

CLEAN SEWERS

are necessary for the

HEALTH

of every community

Connolly's Patent
Sewer Cleaning Device

will clean **any** sewer.
If it doesn't **don't pay.**

M. T. CONNOLLY *Sole Owner*
238 17th Street :: Jersey City, N. J.

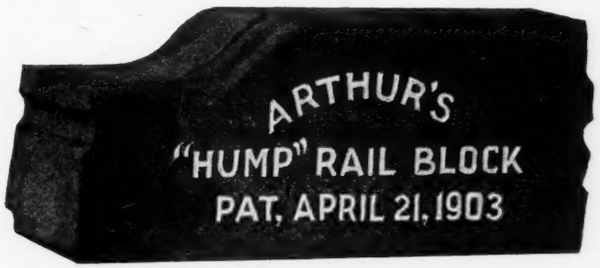
STEAM SHOVELS

Long experience in adapting our Steam Shovels to the requirements of sewer builders has enabled us to reduce cost of excavating trenches to a minimum.

Send for booklet containing information and photographs

THE VULCAN IRON WORKS CO., 117 VULCAN PLACE, TOLEDO, OHIO, U. S. A.

J. JACOB SHANNON & CO., 1744 Market Street, Philadelphia, Eastern Representatives



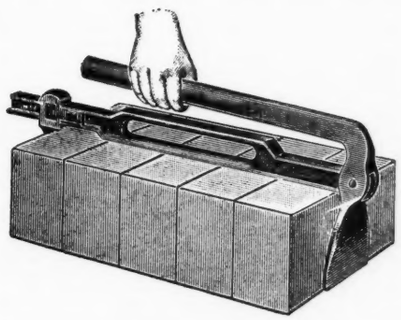
A Perfect Paver for "T" Rails

Repressed Vitrified Brick Blocks

They satisfy the public! They give the Street Railway Companies an opportunity to lay the T-Rail through city streets.

WRITE FOR PRICES

W. H. ARTHUR, .·. Stamford, Conn.



THE

PIERCE BRICK HANDLER

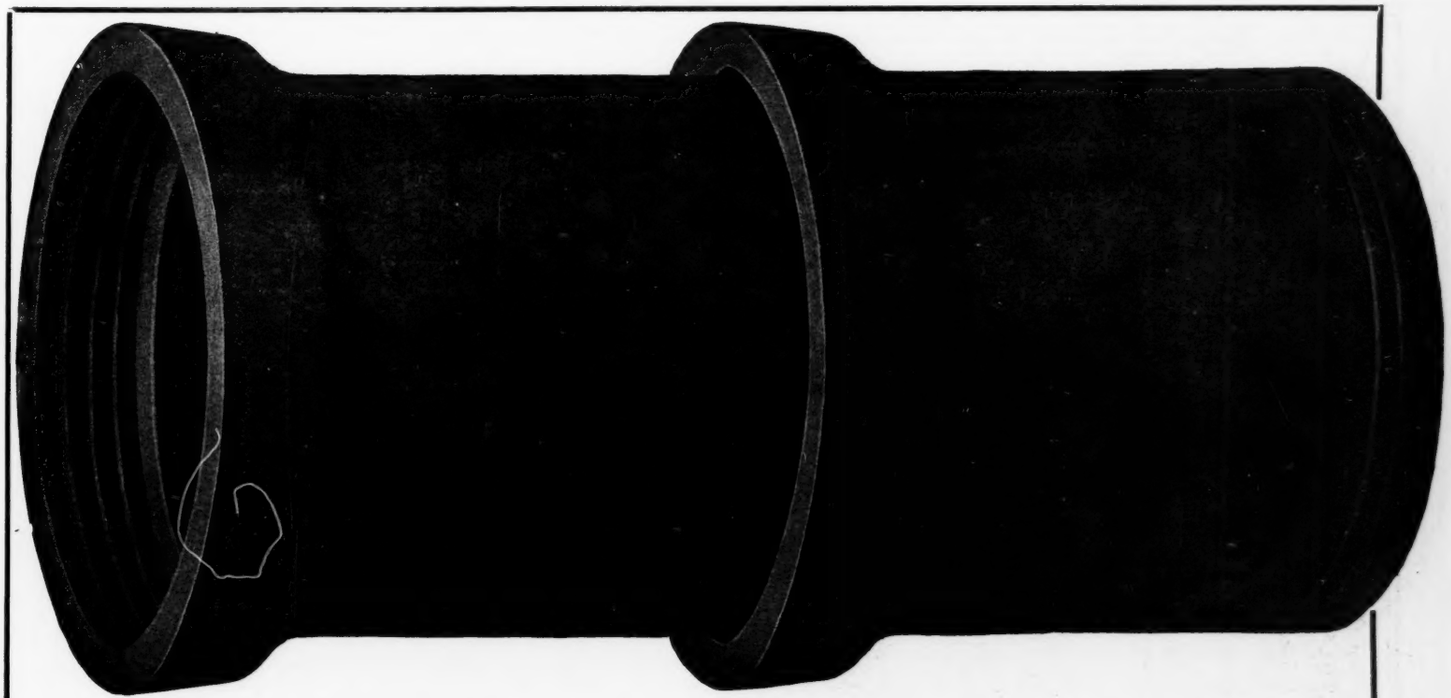
The greatest labor-saving device ever offered to contractors.

A full line of cast iron supplies for street improvement.

Every article of new and improved design at reasonable prices.

THE PIERCE SUPPLY COMPANY,

AMERICAN TRUST BUILDING, ... CLEVELAND, OHIO.



AMERICAN SEWER PIPE COMPANY

PITTSBURGH, PENNSYLVANIA

37 FACTORIES IN 5 STATES.

JAMES M. PORTER
VITRIFIED
PAVING BRICK and BLOCKS
1020 Bessemer Building
Sewer Pipe and Other Clay Products — Pittsburg, Pa.

Clinton Paving Brick Company
MANUFACTURERS OF
CLINTON BLOCK
For Durable Street Pavements
J. W. Robb, Secretary and Mgr. — Clinton, Ind.

THE CLEVELAND BRICK CO.
MANUFACTURERS OF
Vitrified Shale Paving Brick & Block
211 West Fourth St. CANTON, O.
1400 Superior St. CLEVELAND, O.

THE BARR CLAY COMPANY
MANUFACTURERS OF
PAVING BRICK
STREATOR, ILL.

Standard Firebrick Co.
MANUFACTURERS OF
Firebrick and Fire Clay
PAVING BRICK AND BLOCKS

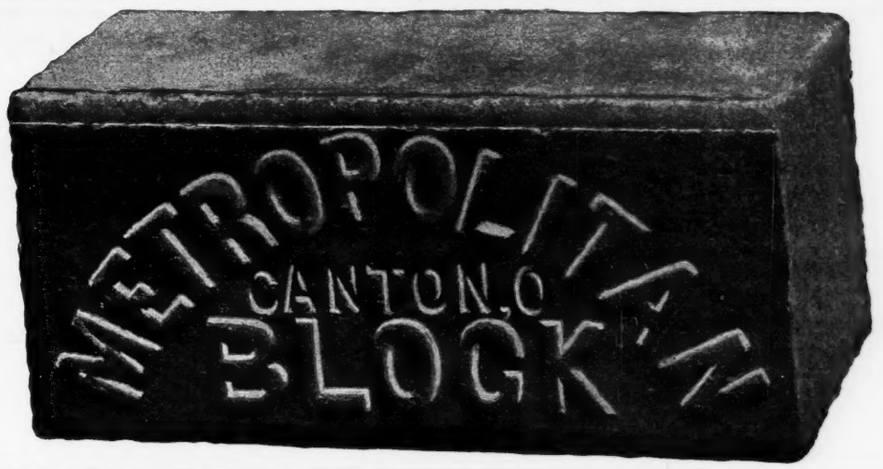
Annual Production 30,000,000 Brick and Block
75,000 Tons Ground and Flaked Clay
Office: Empire Bldg., Pittsburg, Pa.
WORKS:
Empire, Ohio. Irondale, Ohio. Globe, W. Va.

Collinwood Shale Brick Co.
MANUFACTURERS OF
COLLINWOOD
PAVING BRICK and BLOCK
AND
VITRIFIED SEWER BRICK
COLLINWOOD, OHIO

Western Brick Company
DANVILLE, ILLINOIS
Street Paving, Sewer and Impervious Red Building Brick
CAPACITY, SIXTY MILLION ANNUALLY
FIVE RAILROADS

THE
CLEARFIELD CLAY WORKING CO.
Manufacturers of
"CLEARFIELD VITRIFIED PAVING BLOCK"
VITRIFIED BRICK OF ALL KINDS
CLEARFIELD, PENN'A.

Municipal Officials
who want the best
BRICK PAVEMENT
should write us.
A FEW POINTS IN OUR FAVOR
Capacity 63,000,000 per annum
Largest plant east of Hudson River
PROMPT DELIVERIES
and all brick sold under a guarantee
New England Steam Brick Co.
Works: Barrington and Nayatt, R. I. — Providence, R. I.



THE BEST PAVING BLOCK MADE

FOUR FACTORIES
DAILY OUTPUT
300,000

THE METROPOLITAN PAVING BRICK COMPANY
CANTON, - - - - OHIO

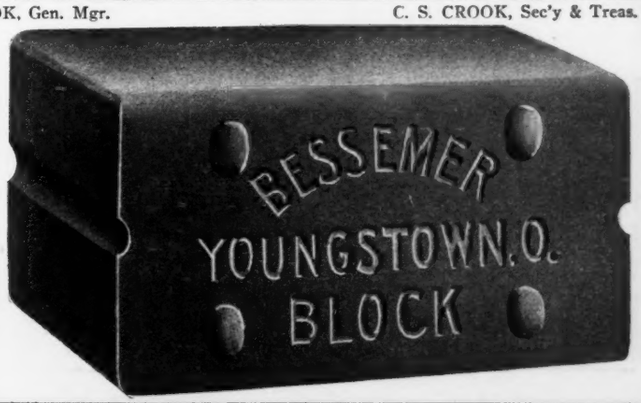
D. V. PURINGTON, President
C. H. CHAMBERLAIN, Treasurer
W. S. PURINGTON, Vice-President and General Manager
W. H. TERWILLIGER, Secret.
F. G. MATTESON, Sales Mgr.

PURINGTON PAVING BRICK COMPANY
GALESBURG, ILLINOIS
MANUFACTURERS OF THE CELEBRATED PURINGTON BRICK
Annual Capacity, 70,000,000
WRITE FOR SAMPLES, PRICES AND SUCH OTHER INFORMATION AS IS DESIRED

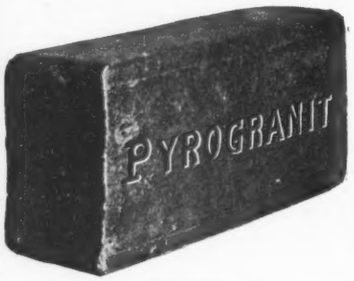
PITTSBURGH CLAY PRODUCTS CO.
MANUFACTURERS OF
CLAY AND SHALE PRODUCTS
ALL KINDS OF BUILDING TUNNEL SEWER PAVING BRICK CONDUITS, PRESSED BRICK FIRE-PROOFING POROUS TERRA COTTA HOLLOW BUILDING BLOCK
SALT GLAZED SEWER PIPE
CAPACITY 10,000,000
LARGEST PLANT IN STATE
OFFICES 232 FIFTH AVENUE, PITTSBURGH, PA.

JOS. G. BUTLER, JR., Pres.
CHAS. M. CROOK, Gen. Mgr.
C. S. CROOK, Sec'y & Treas.

Bessemer Limestone Company
YOUNGSTOWN, OHIO
High Grade Paving, Sewer and Face
BRICK
Capacity 100,000 per Day
SCREENED LIMESTONE
Capacity 3000 tons per Day



NATIONAL PYROGRANIT COMPANY



Sole Manufacturers of

"PYROGRANIT"

PAVING BRICK and BLOCK

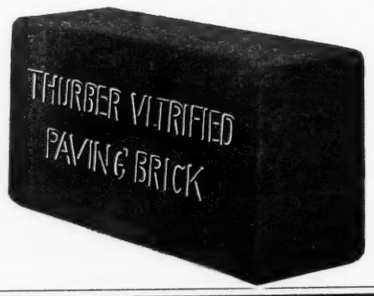
New York Office, 17 Battery Place **FIRE BRICK**
Works, South River, N. J. **FIRE CLAY**

TEXAS & PACIFIC COAL COMPANY,

Miners of Coal and Manufacturers of

THURBER STREET PAVING BRICK,

BUILDING BRICK AND SIDEWALK TILE.



Our Vitrified Paving Brick is equal to any manufactured in the country and Contractors and Architects specify Thurber Building Brick as a standard.

Prices and samples mailed on application. Correspondence respectfully solicited.

Address ARTHUR S. GOETZ, General Sales Agent, Ft. Worth, Texas.

Vitrified Shale Paving Brick and Block
Wire Cut and Repressed

MODERN MACHINERY and METHODS

FRONT BRICK
Repressed and Wire Cut

Buffalo Clay Manufacturing Co.

Works, Orchard Park, N. Y. Office, 41 Franklin St., Buffalo, N. Y.

STEEL CARTS AND WAGONS
FOR GARBAGE, NIGHT SOIL ETC.
TIGHT & ODORLESS EXPLANATORY BOOKLET ON REQUEST
UNITED STATES SANITARY COMPANY WASHINGTON D. C.

Davison Foundry Company
103-109 W. Monroe Street, Chicago, Ill.
Branch, Maywood, Ill.
MANHOLES AND CATCHBASINS
Curbs and Covers for cities, towns and villages. Covers for telephone and electric light conduits. Also manufacturers of power transmission machinery.

MEACHAM & WRIGHT,
Manufacturers' Agents for : : : : : UTICA HYDRAULIC CEMENT,
920 and 921 Chamber of Commerce Building, CHICAGO.

PROFESSIONAL OPINIONS

LONDON, ONT., JAN. 24, 1904

I am satisfied that the Bitulithic pavement on Talbot Street, which was put down some two years ago by the Warren Company, is one of the best, and in fact cannot be beaten.

W. MAGEE,
Western University Medical Dept.

LONDON, ONT., JAN. 30, 1904

We have had the Warren Bitulithic pavement on Talbot Street for nearly two years. It has given good satisfaction. There has been no cause for complaint in any way.

I believe it to be a first-class pavement.

W. E. WAUGH, M. D.

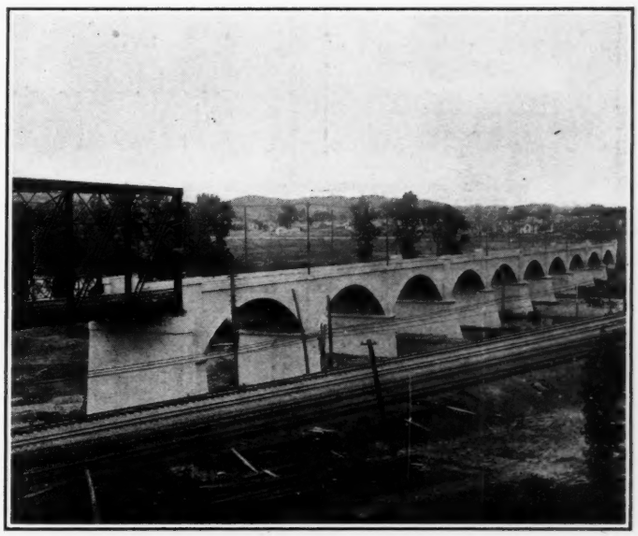
Correspondence Solicited from all parts of Canada.

The Warren Bituminous Paving Company.
OF ONTARIO, LTD.

HEAD OFFICE:
164 BAY STREET,
TORONTO, ONT.

BRANCH OFFICE:
OXFORD & TALBOT STREETS.
LONDON, ONT.

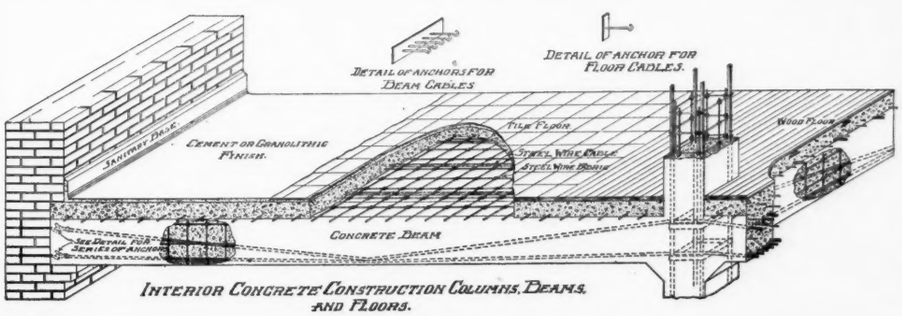
NAZARETH
PORTLAND CEMENT



UTICA & MOHAWK VALLEY RAILWAY CO.
CONCRETE BRIDGE NEAR HERKIMER, N. Y.
OVER 14,000 BARRELS NAZARETH PORTLAND CEMENT.

CHARLES WARNER COMPANY
SALES AGENT
Wilmington, Del. Land Title Bldg., Philadelphia

THE INTERNATIONAL SYSTEM OF CONTINUOUS REINFORCEMENT



INTERIOR CONCRETE CONSTRUCTION COLUMNS, BEAMS AND FLOORS.

EITHER FOR ENTIRE CONCRETE STRUCTURES OR REINFORCED CONCRETE WORK IN CONNECTION WITH STRUCTURAL STEEL : : :

Scientific, Practical and Economical

The International F. and Fireproofing Co. COLUMBUS OHIO

Kreodone Wood Block Pavements

are laid on the heaviest trafficked streets of America; are laid on the finest residence streets and the busiest business streets . . . .

Not a dollar has ever been spent for repairs on any

KREODONE WOOD BLOCK PAVEMENT

They have given universal satisfaction on all of them, being endorsed by Engineers, Municipal Authorities, Paving Contractors, Property Owners, Drivers and Automobilists. They are unequalled for durability, cleanliness, cheapness, safety, comfort, smoothness and ease of traction.

Republic Chemical & Creosoting Co.

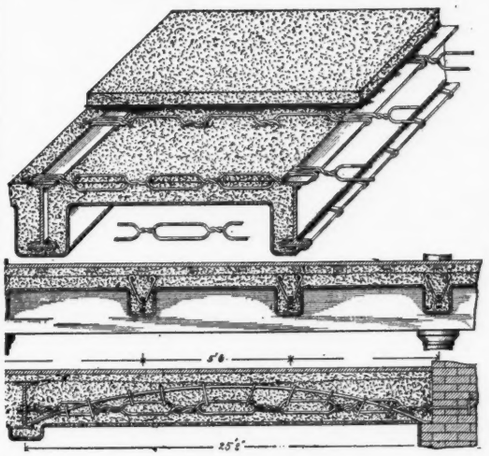
Indianapolis, Indiana

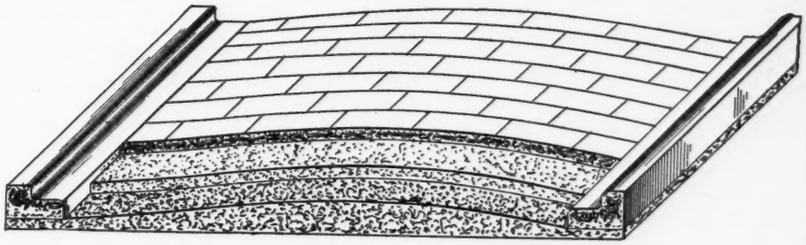
PRODUCERS OF THE WORLD'S BEST PAVEMENTS

STEEL CLAD PAVEMENTS

The Pavement for Heavy Traffic

CONCRETE METAL PAVEMENTS **ASPHALT METAL PAVEMENTS**



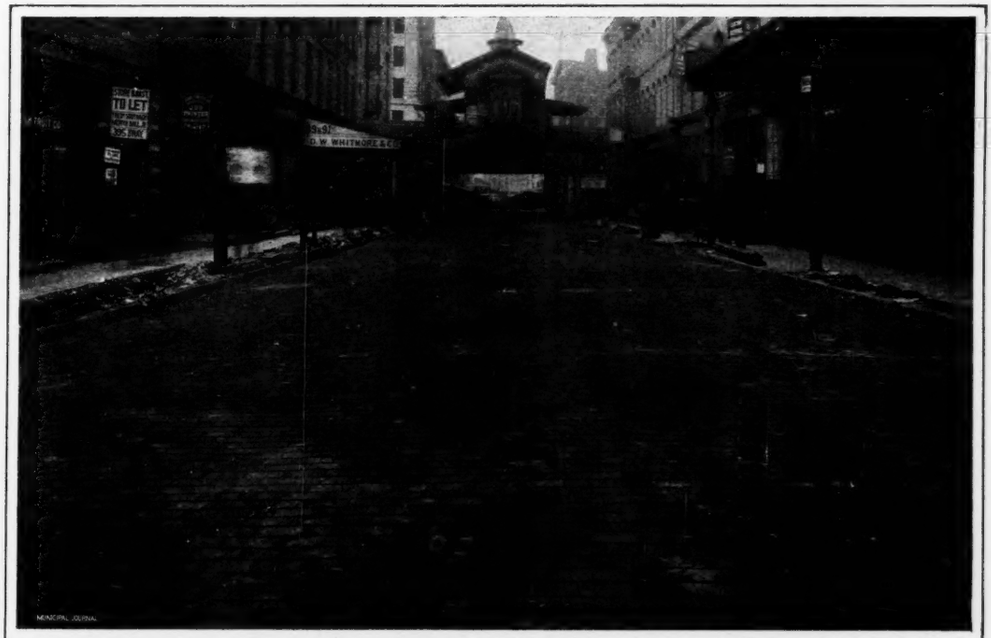


SCHILLINGER BROS. CO.

SEELEY and FULLERTON AVE. CHICAGO, ILL.
CITY PARK AVE. and HAMILTON ST. TOLEDO, OHIO.
ILLINOIS & GRAND TRUNK RY. DETROIT, MICH.

Contractors for Steel Clad Pavements, Concrete Fire Proof Floors, Partitions, Lintels and Columns.

CREO-RESINATE WOOD BLOCK PAVEMENTS



CREO-RESINATE WOOD BLOCK, WARREN STREET, NEW YORK

SMOOTH
NOISELESS
SANITARY

NOT SLIPPERY : :
EASILY REMOVED
EASILY CLEANED

AND AS

DURABLE

AS

GRANITE BLOCK

It is the Best Pavement that can be laid : : : :

UNITED STATES WOOD PRESERVING COMPANY

29 BROADWAY, NEW YORK Works: PERTH AMBOY, NEW JERSEY

LET US PUT YOU ON THE RIGHT TRACK!

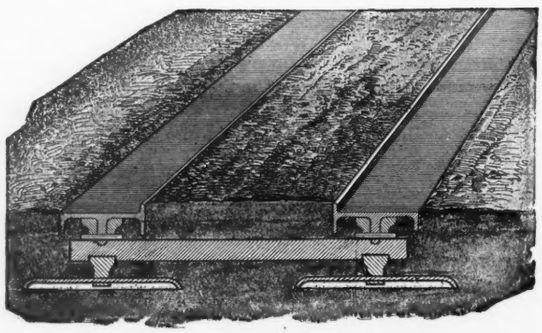
Good Roads Make a Prosperous Country

Send for full information about the ideal road that is free from ruts and that when once built is permanent, requiring little or no repairing, and is as cheap, or cheaper, in first cost than any other road made.

THE STEEL HIGHWAY TRACK

is better for the Taxpayer and better for Horses and Vehicles

It means less wear and tear on the road and wagon and harness, less exertion for the horse, greater speed for the wagon or any kind of vehicle.



This picture shows the Steel Highway Track. Every part of it is interlocking and practically indestructible.

Write for booklet that tells all about it.

One horse on a Steel Highway Track can pull as heavy a load as six horses on a good macadam road, or twelve horses on a good gravel road.

STEEL HIGHWAY TRACK CONSTRUCTION COMPANY OF AMERICA

SALES OFFICE
114-118 LIBERTY ST., NEW YORK

HOME OFFICE
758 DREXEL BLDG., PHILADELPHIA

GET OUT OF THE OLD RUTS

UNIV. OF MINN.
MAR 8 1905

MUNICIPAL JOURNAL AND ENGINEER

VOL. XVII, No. 6. Price 25 Cents
$2.00 Per Year

DECEMBER, 1904

DEVOTED
to
Municipal Progress
and
Public Improvements.

Paving, Road Making,
Street Cleaning,
Street Lighting,
Water Supply, Parks,
Garbage Disposal,
Public Health,
Sewers, Sanitation,
Fire Protection,
Etc. Etc. Etc.

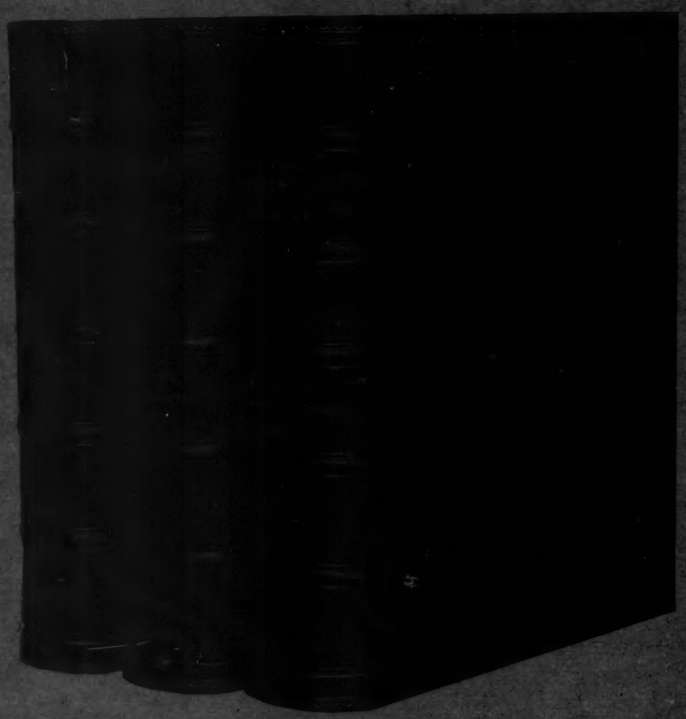
MUNICIPAL JOURNAL
253 BROADWAY

"The bound volumes of the Municipal Journal and Engineer form a library that is invaluable, and there is no city in the country that can afford to be without it."
Oakland, Cal., Enquirer.

Bound Volumes of the

Municipal Journal and Engineer

In Half Morocco as shown below.



Two Volumes to the year, for the years 1901, 1902, 1903, 1904.

Price $4.00 each per year.